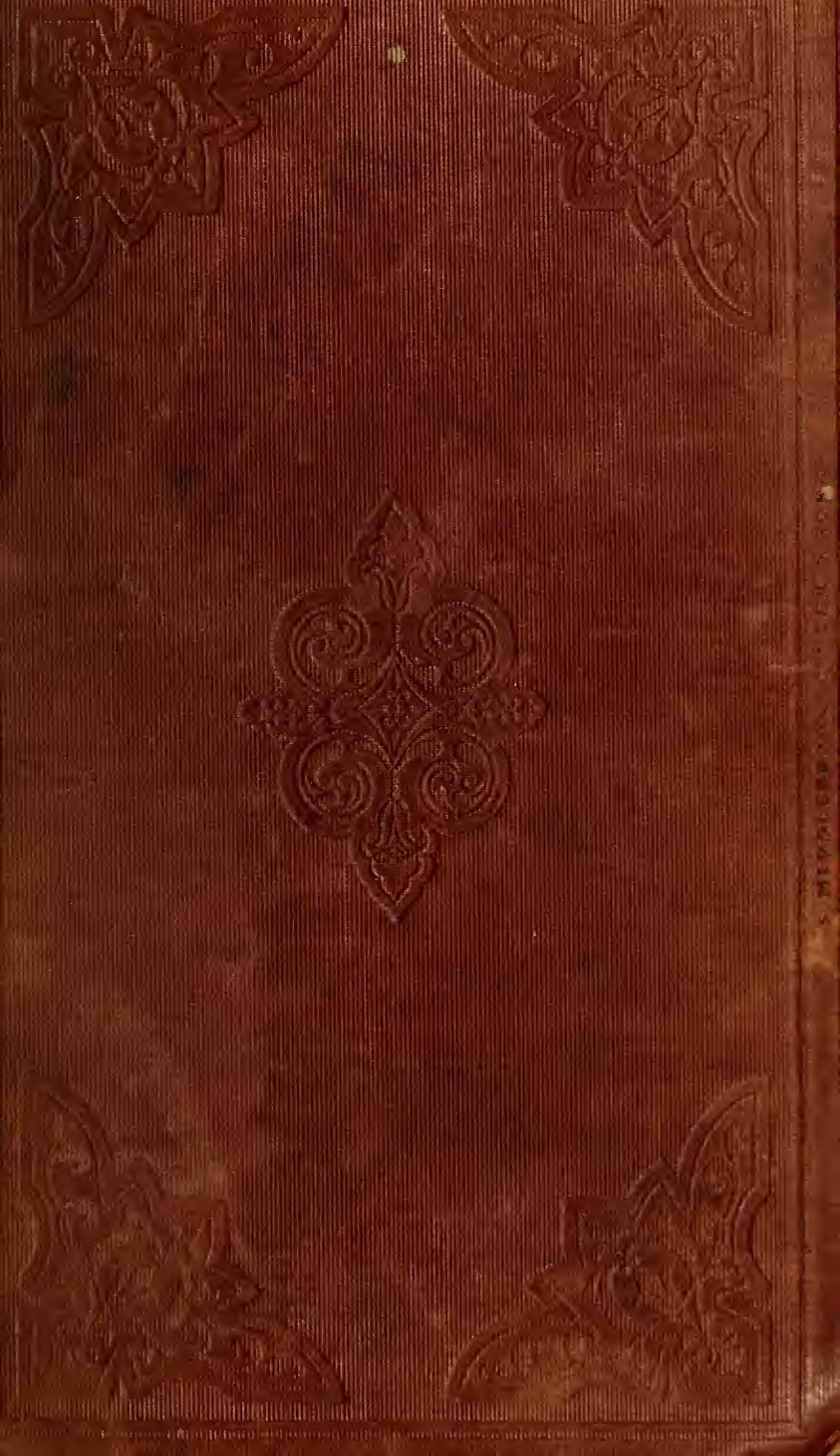

PHYSIOLOGY,

ANIMAL AND MENTAL:

APPLIED TO THE

PRESERVATION AND RESTORATION

OF

HEALTH OF BODY, AND POWER OF MIND.

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GENERAL PREFACE.

To study single departments of man's complicated nature—as his anatomy, or physiology, or phrenology—separately, furnishes a partial and often erroneous view of it as a whole. To obtain anything like a complete knowledge of him requires that his constitution be studied in its COLLECTIVE capacity. He must be known not by sections, but as a UNIT; for in no other way can the reciprocal bearings and complex inter-relations of the multifarious laws of his being be understood. How useless, how imperfect a knowledge of anatomy, unless accompanied by that of both the physiology and the mentality! And the latter two without the former! And the latter without both the others! Nor should this sectional mode of study be longer tolerated. The UNITARIAN aspect of man, and means of improving him, forms the ground-work of these volumes. How far they succeed the reader must decide. They probably constitute the first attempt to put side by side the laws of inter-relation existing between the body and mind.

As our subject is naturally subdivided into three departments, it has been divided into three volumes—the first, devoted to the preservation and restoration of of health, the inter-relations of body and mind, and the improvement of the mentality by improving the physi-

ology; the second, to the regulation of the feelings and perfection of the moral character; and the third, to intellectual cultivation. A system of numbering the paragraphs or heads of the subjects treated, and a reference to them in the text by raised figures, called superiors, renders a reference from each to all perfectly easy and expeditious, so that, after a point has been once presented, it can be referred to specifically, without circumlocution, or repetition, or disfiguring the page. Yet each volume, being complete in itself, can be read separately.

PREFACE.

Power of mind depends on vigor of body. Even the moral virtues are influenced—almost controlled—by physiological conditions. The laws of health, therefore, however important intrinsically, assume a momentous rank in consequence of their controlling power over talent and moral excellence, and should be studied in this their mental aspect mainly. Yet hitherto this reciprocity of body and mind has been almost wholly overlooked. Physiological works stop with laying the foundation merely, just where they should begin to apply their principles to mental improvement. Such application it is the object of this volume to make. The preservation and improvement of health, as a means of developing the talents and moral virtues, are its all-pervading idea. It shows what influences the various states of the body and brain exert over the mind—the effects of various diets and regimen on character, and the improvement and deterioration of mind consequent on cerebral vigor and debility.

The author had not prosecuted those phrenological investigations, which constitute his passion as well as profession, far, before he perceived that the virtues, vices, capabilities, and entire character, are controlled quite as effectually by the physiology as phrenology. This led him to trace out those laws which govern this interrelation, and the results of his observations, in this

almost unexplored field of human inquiry, this volume embodies.

No more of the ANATOMY of the body and its organs has been given than was requisite to illustrate and enforce their physiology, and the preservation and restoration of their respective functions. The vito-chymical discoveries of the great Liebig—that father of "animal chymistry,"—the practical value of which surpass all other modern advancements of science, have been partially popularized and applied in this work, and thus a most important desideratum in part supplied.

Its health prescriptions, as such, have had primary reference to the PRESERVATION of health and the PREVENTION of disease; yet these same prescriptions are as effectual in CURING as in preventing. It attempts to qualify every man to become his own doctor, and especially would impart to parents that physiological knowledge, the seasonable application of which will enable them to keep their families in health, as well as to rout disease in its incipient stages, not, however, by dosing down medicines as much as by an observance of the laws and conditions of health. Nature is the great physician. She alone can restore; and in her cures, unlike poisonous medicines, she fortifies instead of undermining the constitution. To guard against disease—but when contracted, to show patients how to restore health by fulfilling its conditions—is our main design. And if some of these prescriptions seem strange, yet are they not abundantly supported by proof? At least, so certain is the author of the correctness and practical value of all the directions and prescriptions contained herein, that he puts them in RIGID practice—unwilling that his preaching should be in opposition to his CONDUCT.

Still further to enhance the practical value of the work, a table has been prepared, in which applicants can be directed, first, what particular functions they re-

quire to cultivate, and referred to those parts of the work, especially paragraphs, which tell them how to effect such cultivation.

May this volume, both singly and in conjunction with its successors, go forth to lesson human suffering, to restore and enhance the blessings of health and life, and above all, to promote MORAL excellence and INTELLECTUAL progression.

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	Function.	Relative strength.	Cultivation.	Cultivation in children.	Reduction.	Reduction in children.
Health	21*		26	163		
Vitality	28		166	163		
Nutrition	29		63 64		77 78	
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* These figures refer, not to pages, but to those numbered paragraphs, or headings, found throughout the work.

EXPLANATION OF THE TABLE.

The accompanying Table, when marked, will enable those who may secure the requisite examination, to refer to those passages which point out the physiological excess, defect, or derangement, which causes their debility or disease, as well as show them how to ward off predispositions to those diseases to which they are most liable.

A dot, or any other mark, with the pen, will be placed in the square containing the number of the paragraphs which give the required directions. But where several persons are marked on the same table, a horizontal stroke, or dash, — will be used for the first; a perpendicular erected on it thus ⊥ for the second; this perpendicular continued below the horizontal, making a cross, thus +, for the third; a horizontal curve over this cross, thus $\overset{\frown}{+}$, for the fourth; under for the fifth, to the right hand for the sixth, and the left hand for the seventh; so that the following mark $\left(\underset{\smile}{\overset{\frown}{+}}\right)$ stands for all seven.

The written figures in the second column indicate the relative vigor of the health, vitality, and the various functions opposite to which they are written, the scale varying from 1 to 7. Thus: 6 written opposite to Vitality, signifies that it is abundant, while 2 signifies that it is deficient; 4 signifies average; 3 below par; 5 rather above; 7 very abundant; and 1 very deficient. Several persons can be marked in this column also.

NUMBERING AND DEFINITION OF THE ORGANS.

1. Amativeness, Sexual and connubial love.
2. Philoprogenitiveness, Parental love.
3. Adhesiveness, Friendship—sociability.
A. Union for Life, Love of one only.
4. Inhabitiveness, Love of home.
5. Continuity, One thing at a time.
6. Combativeness, Resistance—defence.
7. Destructiveness, Executiveness-force.
8. Alimentiveness, Appetite, hunger.
9. Acquisitiveness, Accumulation.
10. Secretiveness, Policy—management.
11. Cautiousness, Prudence, provision.
12. Approbativeness, Ambition—display.
13. Self-Esteem, Self-respect—dignity.
14. Firmness, Decision—perseverance.
15. Conscientiousness, Justice—equity.
16. Hope, Expectation—enterprise.
17. Spirituality, Intuition--spiritual revery.
18. Veneration, Devotion—respect.
19. Benevolence, Kindness—goodness.
20. Constructivness, Mechanical ingenuity.
21. Ideality, Refinement—taste—purity.
B. Sublimity, Love of grandeur.
22. Imitation, Copying—patterning.
23. Mirthfulness, Jocoseness—wit—fun.
24. Individuality, Observation.
25. Form, Recollection of shape.
26. Size, Measuring by the eye.
27. Weight, Balancing—climbing.
28. Color, Judgment of colors.
29. Order, Method—system—arrangement.
30. Calculation, Mental arithmetic.
31. Locality, Recollection of places.
32. Eventuality, Memory of facts.
33. Time, Cognizance of duration.
34. Tune, Music—melody by ear.
35. Language, Expression of ideas.
36. Causality, Applying causes to effects.
37. Comparison, inductive reasoning.
C. Human Nature, perception of motives.
D. Agreeableness, Pleasantness—suavity

PHYSIOLOGY, ANIMAL AND MENTAL.

CHAPTER I.

HEALTH: ITS VALUE AND LAWS.

SECTION I.

HAPPINESS AND SUFFERING, AND THEIR CONDITIONS.

1. HAPPINESS CONSTITUTIONAL.

HAPPINESS is the constitutional and only legitimate product of every organ of the body, every faculty of the mind, every element of our being. To what else are all our bones, joints, and muscles adapted, both in their functions themselves, and in all that labor and locomotion which they were devised to accomplish? What but exquisite enjoyment is the constitutional product, both of the mere act of seeing, and of that ceaseless round of pleasure and fund of information, as well as range of material for thought, feeling, and happiness, furnished thereby? Pleasure in quaffing luxuriantly the fresh air of heaven, and then in expending the vitality thus obtained, is the only natural function of respiration. For what was the stomach created, but to give us pleasure both in eating and in all its constitutional effects? And for what were brain and nerve created, but expressly to furnish us an inexhaustible range of intellectual and moral enjoyment? And thus of every other physical organ and function.

Each mental faculty singly, and all combined, have the same constitutional adaptation and object. Benevolence was created to bless the needy, pour the oil of consolation into the wounded soul, avoid causing pain, and adorn human nature, as well as to render the giver himself also happy; it being still more blessed to give than to receive. Parental love is adapted both to render parents themselves happy in providing for, and educating darling and dependant infancy and lovely childhood,

and children also happy in receiving the bounties thus lavishly bestowed by parental love. Ideality, exercised in harmony with its primitive function, enjoys a perpetual feast in contemplating the beautiful and perfect in nature, as well as in refining the manners and purifying the feelings of its possessor, and elevating and gracing his entire nature and conduct. Acquisitiveness was designed to give pleasure both in acquiring property and the necessaries and comforts of life, as well as in providing Appetite with food; Benevolence with the means of doing good, Cautiousness with the requisites for shelter and safety, the Social Affections with family comforts, Inhabitiveness with a home, Intellect with books and the means of prosecuting scientific researches, and all the faculties respectively with the means of their gratification. Appetite, besides yielding much gustatory pleasure, nourishes body and brain, and thereby enables them to perform and enjoy the various functions of our nature. Causality experiences a rich harvest of happiness in studying the laws and operations of nature, adapting ways and means to ends, and thereby attaining pleasure only. Language, normally exercised, affords a world of pleasure in the mere act of talking, besides that exhaustless source of happiness experienced in the interchange of knowledge, ideas, motives, feelings, etc., as well as in reading, hearing sermons, lectures, and the like, and in communing with one another in ways innumerable. How vast an amount of happiness is memory capable of conferring on man? How exalted the enjoyment we can experience in worshipping God, and in all those holy emotions and purifying influences prayer is adapted to diffuse throughout the soul! And thus of Friendship, Connubial love, Ambition, Perseverance, Hope, Moral feeling, and every other faculty of the human mind! Does the needle point to its pole more universally than every physical organ, every mental faculty, every element and function of man, points to HAPPINESS—ALL happiness, pure, unalloyed, AND NOTHING ELSE—as its only constitutional product? What else is of any conceivable value to him? For what else was he created? Need so plain a law of nature be farther argued or elucidated?

2. AMOUNT OF HAPPINESS ATTAINABLE.

And the AMOUNT of happiness of which our natures are susceptible is incalculably great—a thousand fold greater, doubtless, than the happiest of mortals has ever yet enjoyed, and almost infinitely greater than the generality of mortals now experience. We little realize how inexpressibly happy it is by nature possibly for us all to become. Our Creator has done all that even a GOD could do to promote this one normal end of life—this only desideratum of our being. In what a perfect paradise does man's primitive constitution place him! Oh! if he would exercise his powers in accordance with their original constitution, how perfectly holy and happy would he thereby become!

3. PAIN EXISTS.

And yet our world is full of suffering and wo! Pandora's box, filled with all manner of diseases and miseries, has been opened upon man! He literally groans in agony! Poverty, wretchedness, loathsome and distressing sickness, the heart-rending decease of friends, children, and companions, and even premature death itself, tearing its victims from life and all its pleasures, torment most mankind! Millions suffer beyond description, and millions of millions are or have been tortured into the wish that they had never been born, or that death, with all its horrors, would hasten to their relief; while most consider our world—so perfectly adapted to promote human happiness—a path of thorns, and life itself a lingering, living DEATH!

4. PAIN NOT NECESSARY.

Yet none of this suffering forms any NECESSARY part of any constitutional arrangement or function of our nature. Teeth are created and adapted to masticate food, not to ache; nor need they ever. The head was not made to ache, nor the stomach to occasion griping pains, nor in any way to distress us. Nor are the lungs adapted to torture us while they waste away in lingering consumption, blasting all our hopes and

happiness. Neither malignant fevers, nor distressing rheumatism, nor torturing gout, nor loathsome, life-eating cancers, nor any other kind or degree of disease or suffering form any part of man's original constitution, nor of nature's ordinances, but all are utterly repugnant to both.

So of the mental faculties. Was Benevolence created to torment us with the sight of pain which cannot be relieved? Or Combativeness to brawl, quarrel, and fight? Or Destructiveness to devastate whole nations with wo and carnage, making loving wives lonely widows, and happy children desolate orphans, by the MILLION, besides all the horrors of the battle field itself? Or Appetite to gormandize till it offers up all that is virtuous and happy at the shrine of beastly gluttony and drunkenness? Or Approbativeness to pinch the feet of the suffering Chinese, or flatten the head of the savage Indian, or deform the waists of simple would-be beauties? Or Self-Esteem to wade through seas of blood to thrones of despotism? Or Veneration to create all the abominations of Paganism, or the bigotry of Christendom? Or Constructiveness to make implements of torture and death? Or Acquisitiveness to cheat and rob? Or Causality to plot mischief and devise evil? Or Adhesiveness to mourn in hopeless grief the loss of near and dear friends? Or Parental Love to torture us with inexpressible anguish by the death of a dearly beloved child, or perhaps entire groups of beautiful and happy sons and daughters? Or Connubial Love to weep disconsolate and distracted at the grave of a dearly beloved wife, or devoted husband—perhaps, too, after every means of support has been exhausted, every child buried, every earthly hope blasted, and while torturing disease is preying upon life itself, and opening the yawning grave at our feet? No, NEVER! Cold and heat are not more unlike than these results are contrary to all of nature's adaptations. Nor is there a single physical organ, or mental faculty, or human function whose normal product is pain, or any thing but pleasure. Any other doctrine contradicts universal fact, attests the ignorance of its advocate, and would fain libel Infinite Goodness!

5. OUR WORLD GOVERNED BY INFLEXIBLE CAUSATION.

What, then, has caused all this wide-spread misery? Eve's eating the forbidden fruit? But that affects all human beings alike; so that, for all ITS influences, all COULD be as happy as any one ever has been or ever will be. Will not the recipients of millennial bounty be incalculably and perfectly happy? Yet they will bear precisely the same constitutional relation to Adam with the most sinful and miserable of mortals. What, then, is its cause?

Hear nature's answer. "All enjoyment, all suffering is CAUSED." The sentient world, in common with the physical, is governed by LAW, the violation of which causes pain, and its obedience pleasure. CAUSE AND EFFECT govern all nature—her pains and pleasures included. All that occurs or is, is CAUSED, nor can any thing whatever occur or exist, without being governed throughout by INFLEXIBLE CAUSATION. But for this all would be chance and chaos; now all is CERTAIN SEQUENCE. But for this every thing would happen, and doleful uncertainty brood darkly over all things; now all is CERTAINTY. These laws reign supreme, and substitute perfect order for complete confusion. From them there is no appeal, and to them no exception. Nor is their action ever uncertain. Given causes always produce specific effects, and their own appropriate effects only; while like causes invariably generate like effects. All, therefore, that we feel, enjoy, and suffer, is CAUSED—is the absolutely NECESSARY product of its own SPECIFIC cause, and of that only. Under similar circumstances nothing else could possibly have occurred; so that all uncertainty is for ever precluded.

6. ALL PAIN THE CONSEQUENCE OF VIOLATED LAW.

Nor are these laws dead letters, nor passive non-entities, nor destitute of divine sanction; but they are clothed with TWOFOLD authority; first in the happiness consequent upon their obedience, and in the pain caused by their infraction. Indeed, happiness is but the legitimate and ONLY effect of their observance, and pain of their violation. Unaccompanied by these pleasurable and painful consequences, they would be power-

less, and therefore useless. Every law of our being is expressly instituted and adapted to secure human happiness—this "chief end of man's creation," the only commodity of any value to him[1]—and to prevent suffering; because unless pain resulted from their infraction, half their present sanction would have been wanting; whereas now, not only do the pleasures experienced in their observance sweetly allure us onward in the same delightful path, but the direful penalties consequent on their violation urge, even COMPEL us, and with a PRACTICAL power greater than any other device could possibly wield, to shun this suffering by complying with their requirements. Pain is constitutionally abhorrent to man—is the only groundwork of all dislike. By an arrangement living back in his very nature, man instinctively and universally shrinks from it as from poison, as well as avoids its cause. Nor does he avoid any thing but what occasions him pain, or for any other reason, and dislikes all things in PROPORTION to the pain they give him, as well as wholly because of such pain. Hence, he instinctively avoids violating law because such violation occasions that suffering which he dreads; and seeks in obedience that pleasure to which he is constitutionally so powerfully attracted. Unless pain existed, sentinel-like, to watch and warn us against violating law, we should be perpetually liable to burn, or bruise, or freeze ourselves to death, many times over, if that were possible, as well as to mutilate and destroy ourselves in countless ways which pain now prevents. This same principle governs equally the laws of mind, and for the same purpose; namely, to secure their observance also. Indeed, law without pain would be but mockery—a rope of sand—and the greater and more uniform the pleasures of obedience, but the more certain and fearful the pain consequent on their violation, the more valuable the law. Happiness is the most persuasive motive to goodness, and suffering the most powerful preventive of sin, which even a GOD could invent; and this double invention of rewards AND punishments—the former sweetly enticing obedience and the latter sternly ENFORCING it—is as perfectly adapted to secure man's highest good as Infinite Wisdom could devise and Infinite Benevolence execute!

7. THESE REWARDS AND PENALTIES SELF-ACTING.

That same Wisdom which devised these laws has also affixed a contrivance by which they are their own executors. They are SELF-ACTING—necessarily inducing, in the very nature of things, their appropriate rewards and penalties. In the very ACT of obedience consists its pleasures, while in and by the very transgression itself, consists its penalty. To obey any law is to secure its legitimate blessings; to transgress it is to insure its consequent sufferings. No escape, no evasion of either can possibly occur throughout God's vast dominions. Obedience and its consequent happiness are linked inseparably together; while sin and suffering go hand in hand throughout the universe! Neither can ever be separated from the other!

Be it, then, remembered by every human being, that "affliction cometh not forth of the dust," nor doth pleasure "spring out of the ground," but that ALL suffering is caused—is the constitutional and inevitable CONSEQUENCE of violating law, and that all enjoyment flows naturally and necessarily from obedience. Nor is it possible, in the very nature of things, to obey or violate any law whatever, without inducing these results; nor of experiencing these results except in and by such violation. No pain, uncaused, was ever sent by God, nor any blessing ever conferred except in conformity with these unalterable institutes of nature. Even judgments and mercies themselves are brought about by causation. Hence, happiness is in as exact proportion to obedience, and sinfulness to suffering, as the God of Heaven can mete them out.

8. THESE LAWS COGNIZABLE.

Nor are these laws a sealed book to man, nor hidden in labyrinthian mazes, ready to spring upon him like serpents from the grass or tigers from their lairs. This would render them useless as well as "charge God foolishly." No mist, no uncertainty beclouds any of them. They are open, palpable, and lighted up by the full blaze of both philosophy and perpetual experience. Nor need any of them ever be misapprehended. Those who cannot discern them, not as in a glass, darkly, but clearly and fully, as in the noon-day sun, are either

blinded or stupid. Such cognizance is even THRUST continually upon us.

9. MAN CAN APPLY THEM.

To this capability of understanding them God has graciously superadded the power of APPLYING them. Man can REACH them—can adapt means to ends; that is, control effects by applying causation so as to bring about desired ends. He is, moreover, endowed with that power of choice or will which enables him to obey or violate at pleasure, and thus to render himself good or bad, and therefore happy or miserable, according as he may determine. He is thus capacitated, by obeying these laws, to apply them to the promotion of his own happiness and the well-being of his fellow men; or, by ignorantly and wickedly breaking them, to occasion an incalculable amount of suffering, both to himself and his fellow men. In general, those suffer most who have sinned most, and BECAUSE of their sin; while those who are the most happy are so because the most OBEDIENT—our enjoyments and sufferings being the thermometers of our righteousness and sinfulness. Though some inherit painful diseases and vicious predispositions from parents, and thus suffer for sins not their own, and though our inter-relations with our fellow men often cause us to suffer for their sins, yet, in the main, we obey and enjoy, or sin and suffer, FOR OURSELVES, and reap the consequences of our OWN conduct. Hence, by avoiding all sin we can escape all suffering, and in that proportion. So if we obey all the laws of our being, we shall become as PERFECTLY happy as it is possible for human nature to become or endure—every department of our entire being literally overflowing with unalloyed bliss.

10. HAPPINESS AND SUFFERING ANALOGOUS TO THE LAW OBEYED OR BROKEN.

All enjoyment also flows in the direct LINE of that obedience which caused it, and all suffering follows directly in the WAKE of its sin. Each bears a close resemblance to its origin. Thus the violation of the law of appetite inflicts a given kind

of suffering, which is analogous to the law violated; namely, it disorders the stomach, corrupts the blood, and causes disease and suffering throughout this whole department of our nature; but those who violate the law of chastity experience an entirely different kind of pain, occurring in the social department of their nature and its dependancies; yet if, meanwhile, they obey the laws of appetite, they enjoy the pleasures conferred thereby. Whoever violates the laws of Acquisitiveness, by hoarding immense wealth, or obtaining money by fraud, gambling, or any dishonest means, invariably suffers on its account. What gambler or robber ever enjoyed his booty? HONESTY alone is policy. Getting money dishonestly occasions its pernicious expenditure, while earning it secures its judicious use. Those even who acquire it too easily and rapidly, generally live luxuriously, and thus suffer in and by the very money thus obtained without its being earned. Yet if such obey the laws of health, or Ideality, or any other laws, they will enjoy the benefits of whatever laws they obey.

This analogy of all enjoyment and suffering to the law obeyed or broken, renders it easy to trace our respective pains and pleasures—mental and physical, public and private, collective and individual—directly and CERTAINLY to their causes; that is, to the laws obeyed and broken. This great PRACTICAL truth teaches all mankind both the CAUSES AND REMEDIES of every evil experienced and suffering endured, as well as how to obviate them, and also just what promotes happiness that we may "seek it yet again."

11. IMPORTANCE OF UNDERSTANDING THESE LAWS.

By as much, then, as we value happiness and dread misery, let us all apply ourselves most diligently and perseveringly to the STUDY of these laws, as the first step towards their obedience. Though we may indeed light upon such observance without understanding them, and should if our natures were unperverted, yet how much better with? Ignorance is the evil, knowledge the remedy. To make men better, show them the CONSEQUENCES of both obedience and transgression. These great PRACTICAL motives once realized, take so FEELING a hold

of all mankind as literally to compel obedience [7], and are more efficacious than all others combined. Ignorance of consequences is the great parent of most of man's sufferings, and a knowledge of them the first, second, and third all-powerful instrumentality of restraining sin. "Knowledge is power," and knowledge of these laws, that is, of the conditions of enjoyment and causes of suffering, is as much more powerful for happiness than all other species of knowledge, as it enforces these laws, and shows us how to gather in perpetually from the prolific vine of our natures, those rich clusters, in all their endless varieties, of the choicest delights of our nature, which a bountiful God has adapted it to yield, as well as escape that wretchedness which floods our world! As happiness is the "chief end of man," that species of knowledge is the most important which the most effectually furthers this end, the happiness it is capable of conferring being its only measure of value. Now since a knowledge of the laws of our being or conditions of happiness, is incalculably more PROMOTIVE of this happiness than that of astronomy, natural-philosophy, languages, etc., it is therefore proportionally the more valuable. Truly,

"Man's greatest knowledge is HIMSELF to know."

He is most wise who best knows how to render himself happy; yet grossly ignorant are all those who do not, however learned in physics, Grecian and Latin ore, politics, literature, and every other species of knowledge. That study, too, is greatest which unfolds the greatest variety, and the highest order of these laws, and can be turned to the best practical account, in both of which the study of HUMANITY exceeds all others. Man is the epitome of the universe, and his study is the study of the greatest work of God!

12. OBJECT OF ALL EDUCATION.

To EXPOUND THESE LAWS and enforce their observance, should therefore be the one distinctive end and drift of all education, domestic, common, and classic. As happiness is the only "end of man" and acquisition of any value, all education should be directed to its attainment, nor is it of any

possible use or value farther than it does this. Education should then teach first and mainly the NATURE OF MAN, and other studies only as collaterals till this species of knowledge is complete. This point is clear; yet how utterly foreign to this object is all education as now conducted! Pupils are taught scarcely any thing concerning themselves, physically or mentally, or how to render themselves happy, or how to avoid pain. That our educational system is slightly improving, is admitted, yet it requires not to be PATCHED up or mended, but to be completely REMODELLED. We want every thing NEW, not the old revised, as we shall see throughout these entire works. We require an education which shall TEACH NATURE, especially HUMAN nature, instead of books transmitted through the dark ages. The school and pseudo-scientific books now taught are exceedingly deficient as exponents of nature, and omit our own almost wholly. Yet all school-books should teach nature in general, and human nature—its laws and conditions of happiness, in particular.

13. PHYSIOLOGICAL AND PHRENOLOGICAL EDUCATION.

What then are some of the principal laws of our being, by understanding and obeying which we can so effectually augment both our own happiness and that of our fellow men, as well as escape suffering by obviating its cause? This eventful inquiry phrenological and physiological science answers in the exposition they furnish of the primitive constitution of man. Phrenology expounds all the laws of our physical constitution, and thereby all the conditions of life, health, and animal enjoyment; while Phrenology unfolds all the laws of MIND, to fulfil which constitutes the observance of all our moral duties and the consequent enjoyment. Both combined therefore evolve all the elementary conditions of human happiness, together with all the prominent causes of human suffering and woe, and all so plainly that those that run can read. Being true—and this is taken for granted in this series of volumes, but fully proved elsewhere — they of course develop those laws and conditions in harmony with which GOD CREATED MAN, and therefore embody his entire nature with all its laws.

To interpret these laws and their accompanying conditions of happiness sufficiently to elucidate and enforce their observance, and thus to promote human improvement, is the distinctive object of this series of volumes. God grant that it may render every reader, and through them countless thousands, the more virtuous and happy in this life, and thereby better fitted for that which is to come.

SECTION II.

RECIPROCATIONS EXISTING BETWEEN THE BODY AND THE MIND.

14. MAN A PHYSICAL AND MENTAL BEING.

If man had been created a purely physical being, without any mind, he could have accomplished nothing, could have enjoyed nothing. Or if he had been created a purely spiritual being, without a material organization, this world, with all its adaptations for promoting human happiness—the glorious sky over our heads and the flower-spangled lawn under our feet, the life-giving sun and health-inspiring breeze, the rains and dews of heaven, and all the fruits, bounties, and luxuries of earth—as far as it concerns man, would have been made in vain. But he has been created a COMPOUND being, composed of flesh and blood, on the one hand, and of mind and soul on the other; and wonderful indeed—the workmanship of GOD—is this union of mind with matter, and pre-eminently promotive of human happiness.

15. MIND AND BODY PERFECTLY INTER-RELATED.

Nor are these respective natures strangers to each other. Indeed, they are so closely inter-related that every action and condition of either exerts a perfectly reciprocal influence on the other. This vital truth is PRACTICALLY established by the perpetual EXPERIENCE of every member of the human family. Thus a clear, cold morning, produces directly opposite effects on the mind by differently affecting the body. Fevers enhance,

and often derange the feelings and mental manifestations, by augmenting the action of the brain; while hunger, fatigue, debility, and the like, enfeeble the former by diminishing the action of the latter. Dyspepsia induces gloom and mental debility, by deranging the physical functions—rendering its victim irritable, misanthropic, wretched, disagreeable, and utterly unlike himself. Physical inaction induces mental sluggishness, while bodily exercise quickens intellectual action and promotes happy feeling. Excess and deficiency of food and sleep affect the mind powerfully, yet very differently. Experience has taught many of our best speakers to prepare their minds for powerful effort by PHYSICAL regimen. Certain kinds of food stimulate some of the propensities, while other kinds augment our ability to think and study. Fasting promotes piety, but "fullness of bread" augments sinful desires. Sickness enfeebles the mind and health strengthens it. Cerebral inflammation causes insanity, and its inaction, as in fainting, mental stupor. Both morality and talent are affected more by food, drinks, physical habits, sickness, health, etc., than is supposed. When the devout Christian or profound thinker has eaten to excess, or induced severe colds or fevers, or in any other way clogged or disordered his PHYSICAL functions, the former can no more be "clothed with the spirit," or "soar on the wings of devotion," or the latter bring his intellectual energies into full and efficient action, than arrest the sun. Indeed, most of our constantly recurring transitions of thought and feeling are caused by physiological changes, nor can the latter ever occur without correspondingly affecting the mentality. "A sound mind in a healthy body" expresses this great truth, which the practical EXPERIENCE of all mankind confirms. In short, as well dispute our own senses as controvert this doctrine—felt perpetually by every human being—that both mind and body powerfully and reciprocally affect each other.

16. EFFECTED BY MEANS OF THE BRAIN—THE ORGAN OF THE MIND.

This reciprocity is effected by means of the BRAIN,—that great focus of the system which experiences all sensation, and issues all mandates. To enter fully upon the proof of this

cardinal doctrine, that the brain is the organ of the mind—the great instrumentality of thought and feeling—would be superfluous, because, though it lies at the very basis of all the laws and facts adduced in these volumes, yet it is so generally admitted by physiologists, philosophers, metaphysicians, and mankind at large, that it may properly be assumed. The converging FACTS, that several times more blood—always abundant in any part in proportion to the expenditure of vitality in that part—is sent to the head than to any other portion of the body; that pressure upon the brain suspends the action of the mind, while pressure upon no other portion does this; that the entire nervous system connects with the brain, where its functions are performed—proved by the destruction of those functions consequent on severing any nerve in its passage from any part to the brain—that we know of no other function which the brain performs, except it be the mental, yet that its location and structure indicate its performance of the highest function of humanity; and that the size and conformation of the brain correspond with the characteristics of the mind —proved by phrenological science—together with many others of a kindred character; render the inference that the brain performs this highest function of our nature absolutely certain. Every existing physical condition is instantly, accurately, and fully reported to the brain, where it is mainly felt. The various states of the brain, as of rest and action, vigor and exhaustion, health and disease, induce corresponding states of the mind, over which they exert a controlling influence. The brain is therefore the organ of the mind—the great agent by which emotion is manifested and intellect put forth.

The various conditions of the brain and mind must therefore be perfectly inter-related. The requisition for this perfect sympathy between the mind and its organ, is ABSOLUTE—based in the very nature of things. As no function or product of any organ can ever take place without the corresponding action of that organ itself, so, the brain being the organ of the mind, no action of the latter can ever take place except in connection with and by means of the former; nor can the brain act without producing mentality. And since this inter-

relation exists in regard to their action, it of course governs all their other relations. The universality and imperiousness of this inter-relation is what constitutes any organ an organ. Without it, an organ is no organ, and no organ can be an organ. The mere fact that the brain is the organ of the mind, pre-supposes and requires this perfect reciprocity of all its states and conditions with those of the mind.

The brain, besides being the organ of the mind, is also perfectly inter-related to the body as a whole, and to all its parts. This is fully demonstrated by that perfect tissue of communication, shown by anatomy to exist between every portion of the body and the brain, and confirmed by the perpetual experience of all mankind; so that the sympathy existing between all parts of the body and the brain, is both perfect and universal. Its states partake of theirs, and theirs of its; so that a common reciprocity governs them all. Hence, since the states of the mind reciprocate perfectly with those of the brain, and the brain with those of the body, therefore the several states of the physiology and the mentality bear a perfect reciprocity to each other. The brain is perfectly inter-related to the body, and the mind to the brain, and therefore the mind to the body through the brain; so that all the conditions of body, brain, and mind permeate each other. Every throb of the physiology produces a corresponding pulsation in both the brain and mind; every condition of the brain is reciprocated throughout both the entire body and mind; every state of the mentality induces a corresponding state in the brain and body. This inter-relation of all three to each other, is both absolutely necessary and perfectly reciprocal. Since, then, all the physical functions and conditions thus reciprocally affect the brain, and since all the cerebral react thus powerfully and perfectly upon the mental, therefore all the physical reciprocate with all the mental; nor can the body be affected in any way, or in the least, without thereby similarly affecting both brain and mind; otherwise the brain cannot be the organ of the mind, whereas we know it is—otherwise, none of the physical conditions affect the mental, whereas we know they all do.

17. UNIVERSALITY OF THIS RECIPROCITY.

Not only do these reciprocal relations exist, but, in common with universal nature, they are governed by undeviating causation; otherwise, all the evils consequent on no causation would appertain in a pre-eminent degree to this the highest department of nature [5]. Therefore no physical condition can exist without affecting both brain and mind, nor can any physiological changes occur without inducing similar changes in the mentality, because nature never does things by halves, but whenever she sees best to govern a PORTION of any class of her operations by certain laws, she always governs the WHOLE of that class by the same laws. Thus, she does not govern a part of the operations of vision by the laws of optics, and leave a part ungoverned by these laws, but she governs ALL the former by the latter. And thus of every conceivable application of this principle of universality. That same utility—and nature is all utility—which renders it best to throw law over a PART of any class of her operations, renders it equally serviceable to extend that same law over this entire class. Besides, how awkwardly it would look and work if a part were thus governed, and a part left wholly at random? Does nature ever adopt this piecemeal, patchwork system? If so, causality is a nullity and God irregular—a supposition utterly unphilosophical and untrue [15]. These inter-relations between body and brain and brain and mind, and of course between body and mind, are therefore systematic [453] and universal, so that all the states and changes of either correspondingly affect the other. This position is utterly incontrovertible and absolutely true—an ordinance of universal nature. It is established and effected by the two palpable FACTS, that the brain is the organ of the mind, and then inter-related to the body; both of which obtain universally. To question the latter is to dispute an anatomical fact, and to deny the former is equivalent to denying that the mind has any connection with the body, or with matter; for if this connection does not take place by means of the brain, it does not take place at all, or exist. But mind IS related to the body, and affected by organic conditions [15]. Therefore ALL is relation. We KNOW and FEEL

that SOME physical conditions similarly affect the mind: therefore every condition—every change in every portion of the body—similarly affects the brain, and thereby the mental manifestations. To excite, or invigorate, or debilitate, or disease, or restore the body, therefore excites, or invigorates, or debilitates, or diseases, or restores the mind itself; and improving the latter also improves the former. The two, and all their existing states, are as effectually and completely interwoven with each other as the warp and woof, and thus interwoven, constitute the warp and woof of our terrestrial being.

18. OPERATING ON THE MIND THROUGH THE BODY.

This great principle of mental and cerebral inter-relation gives us the KEY OF MIND—puts us in possession of the HELM OF THE MENTALITY—and shows us how to control—accelerate, retard, impair, restore, augment, discipline, or modify at our pleasure—any and all the mental operations, by controlling the physiological conditions. It tells us how we may throw MIND into any given state, namely: by throwing the body into the corresponding state; nor is it possible to affect either in any manner or degree without thereby similarly affecting the other also, any more than to arrest the action of any other law of nature.

19. IMPORTANCE OF UNDERSTANDING THESE RELATIONS.

This principle of the reciprocity between the physiology and the mentality, is simple in structure but all powerful in its influence, and imbodies truths of the highest practical moment to every member of the human family; because it is completely interwoven with every exercise of the mind, and in consequence, with every item of progression, personal and public, in mental discipline and moral excellence; with every manifestation of talents, every improvement in virtue, every twinge of pain, every pulsation of enjoyment; all of which it goes far to determine. In short, it lies at the very basis of the intellectual and moral nature of man—that highest department of his nature[401]. Man is indeed the greatest terrestrial work

of God! But what department of his nature constitutes its crowning excellence? Which is the king and which the subject? For which are all its other departments created? For his MENTALITY. Happiness being his legitimate destiny[1], which enjoys and suffers? MIND. Was man created mainly to eat, sleep, breathe, labor, glitter, and die? No, but to FEEL AND THINK. And what constitutes his identity and personality—his essence, HIMSELF? His dress, or even body? Neither, but his SOUL. This imbodies the manhood of man. All else is extraneous. Cut from him, if that were possible, limb after limb and organ after organ, till all shall be removed, but leave his mind entire, and he remains the same being still; but his body, separated from his immortal spirit, is not himself. Socrates being asked where they should bury him, aptly replied, "Bury this body where you like, but it is not me. My MIND is myself; that can NEVER be buried, but goes to dwell with the gods." Our MENTAL faculties constitute ourselves*—our very being and quintessence—flesh and blood being our earthly habitation merely.

The laws of mind therefore constitute the highest grade of laws which appertain to our being, and the observance of these laws therefore yields more enjoyment, and that more exalted, than obeying any other, while their violation inflicts the highest kind and degree of misery supportable or imaginable. Hence, since a knowledge of the laws of our being is the most important species of knowledge[11], and since the laws of mind imbody the highest order of these laws, therefore the study of the LAWS OF MIND—of the physico-mental conditions of happiness and virtue, or of the physical conditions as affecting the mentality—constitutes the highest of all human investigations. Since we can control the physical conditions by air, exercise, sleep, diet, and general regimen, and thereby the mentality[18], and since such mental control is the highest of all human attainments[19], therefore, to ascertain WHAT states of the physiology will augment moral and intellectual action, and

* See an explanation of Consciousness in the American Phrenological Journal for 1847.

what will occasion mental gloom and wretchedness, or kindle sinful propensity, not only constitutes the highest order of knowledge, but also imparts the highest order of power. "Knowledge is power," but no other knowledge is equally power to ENHANCE THE MORAL VIRTUES AND INTELLECTUAL CAPABILITIES, as well as to avoid temptations to sin. No charioteer can manage his well-trained steed as easily or effectually as a full knowledge of these physico-mental relations will enable us to control—augment, restrain, direct—our states of mind and feeling. By its application, we can enhance cerebral efficiency and therefore mental power many hundred per cent.; or proportionably augment the action of particular cerebral organs, and therefore of any required talent or virtue. Yet who understands this subject? What treatise, even on Physiology—that department to which it rightly belongs—even attempts its elucidation? And yet to unfold and enforce this subject, should be the main object of ALL physiological works; because this imbodies their great utility.

To the exposition and application, therefore, of a principle thus vast in its range and vital in its character, this series of volumes is dedicated. The momentous questions, WHAT physical conditions induce given mental manifestations? into WHAT states shall we throw the body in order thereby to promote particular moral emotions and tendencies, or enhance particular intellectual powers and manifestations? it will endeavor to answer, and thereby to put its readers in possession of the keys of personal happiness, and the great lever with which to move mind. God grant to the author a full conception and faithful delineation of the momentous practical truths unfolded by this principle, and to the reader the power to understand, and will to apply them.

SECTION III.

HEALTH: ITS VALUE, FEASIBILITY, AND DUTY.

"The poor man's riches, the rich man's blessing."

20. HEALTH DEFINED.

It consists in the vigorous and normal or natural action of all our organs and powers; while disease consists in their disorder, and death in their suspension. Life also consists in the same action, and both health and life are proportionate to its amount. Hence, by improving the former we enhance the latter; but in proportion as we enfeeble or disease these functions, do we thereby diminish life and all its pleasures. Viewed in any and every aspect, HEALTH IS LIFE, AND LIFE IS HEALTH. The

21. VALUE OF HEALTH

Therefore exceeds that of anything else; because it imparts the greatest attainable zest and relish to life and all its blessings. Nor can we even enjoy life, except by its instrumentality, and in proportion to its vigor. Without it, what can we do, or become, or enjoy? Other things being equal, our capabilities for accomplishing and enjoying are proportionate to its vigor, and become enfeebled as it declines. Neither all the attainable wealth, nor honors, nor blessings of life can render us happy any farther than we have health to enjoy them, and their value diminishes in proportion as health declines. When disease has destroyed appetite, the most delicious food and fruits only nauseate; yet how much a keen appetite, consequent on excellent health, relishes them? Well might the glutted epicure offer the beggar-boy a guinea for his morning's appetite. The rich invalid is poor, because he cannot enjoy his possessions; yet the healthy are therefore rich, because their fund of life and capabilities of being happy, are great. Those who have always enjoyed health, little realize its uses or value. As we measure time by its loss, so

we rarely estimate the blessings of health till it declines. O! I would give my all—all the WORLD if mine—for the re-possession of that health—LIFE—I have carelessly and wantonly squandered, and that without having received any value in return for this choicest gift of heaven. Brought to the brink of the grave—our last hour come—what would we all give—what NOT give—for another year of life, with all its pleasures? Astor's thirty MILLIONS would be cheap, because life confers almost infinitely more happiness—the only commodity of any value to man[1]—than all else put together. Then what consummate foolishness to trifle with health as almost all now do! Esau's folly was wisdom in comparison with theirs who carelessly give away a lifetime of vigor for one of feebleness—who even barter life itself for some momentary indulgence. A foolish ambition breaks down the constitutions of a vast number of the young—of all. Unwilling to be out-done, perhaps they work at the top of their strength as long as they can stand up, or over-heat themselves, or, in a single day or week, induce some complaint which debilitates them for life, and hurries them into premature graves. An ambitious youth, just to show how much he could do, worked to complete exhaustion, and till he lamed his side; so that these fifteen years he has been an invalid, can do scarcely half the labor he formerly did, and some kinds not at all, besides working in almost perpetual pain. That single day's work did him vastly more injury than any fortune could ever do him good—gave him more pain than any amount of money could ever have given him pleasure, because it weakened all his capabilities and pleasures, and enhanced all his suffering, FOR LIFE, which it will shorten many years. And yet he received no extra pay for this destruction of health, but sacrificed a vast amount of happiness and even of LIFE, upon the altar of foolish pride. Nor are such instances of folly—of the worst forms of wickedness even—rare. What reader of thirty, if not of fifteen, has not injured health forever, and shortened his days, by similar exposures or imprudences? And how few take any pains to invigorate health and prolong life, but how many ignorantly and wickedly squander BOTH almost daily, and in a great variety of ways?

22. SICKNESS COSTLY

Another motive, inferior in itself, yet in this dollar-and-cent age, highly practical inducement to preserve health, is the PECUNIARY advantages it confers, and loss consequent on sickness. Health allows you to be always "on hand" for business, from which sickness takes you, and compels you to intrust its management to others—always disastrous—or suspends your wages, if you labor. It also incurs heavy bills for doctors, nurses, and other incidentals, and occasions a great variety of pecuniary losses. So, measurably, if any of your family is sick—especially a wife. How many readers, now poor, would have been rich if their families had always been well? In this country, those who, with their families, are uniformly healthy, rarely ever need be poor. Indeed, no stroke of pecuniary policy equals that of PRESERVING OR REGAINING HEALTH. Still more:—

23. DISEASE PAINFUL.

See that sick child. How forlorn and wo-stricken its looks! Mark those rheumatic or gouty subjects; every motion painful, and most of their sources of pleasure converted into wormwood. Behold that wretched victim of disease lying prostrate on a sick bed! Torn from business, society, and all the enjoyments of life, and, instead, racked with pain; the boiling blood coursing through his veins, swollen almost to bursting. Hear his piteous wail—"My head, O, my head!" See those eyes rolling in agony. Open the windows of his soul and behold his struggle for life in the midst of death! His horrid dread of death far exceeds the torturing pains of disease. Hark! hear him pant for breath. Witness that gurgling in his throat. Behold the last agonizing struggle between life and death, and that final giving up of the ghost! What is more dreadful than sickness? What horror of horrors at all compares with that most awful scene experienced on earth—premature death?—from which may God deliver us. Rather let us all strive to deliver OURSELVES—for no one ever dies till he has either so far impaired his health as to have exhausted

life, or else till he is worn out, and dies a natural, and therefore a pleasurable death. Be it remembered by all, that no human being can injure health at any period of life, without proportionally shortening life—without being brought to the strictest account at its close, and compelled to end it as much sooner than he otherwise would, as he has injured his health during his whole lifetime. Health—life[20]—is a sum of money in bank, the interest of which, economically used, will support you. But you spend foolishly, and draw on the principal. This diminishes the income, and you draw the oftener and the larger drafts, till you exhaust it and become bankrupt. As every draft drawn must be reckoned in that final settlement which every draft hastens, and as the faster you draw the sooner you exhaust it, so every cold or rheumatic affection induced, every instance of over-eating, over-working, and straining, every imprudence—whatever injures health—is a draft on life which death cashes and charges at a thousand per cent. interest; and when you have drawn out your fund of life —but never till then—he summons you to your final account, and sends you to your grave. Thus every abuse of health while you live, enfeebles your powers for the remainder of your life, and hastens death! Ho, youth! ho, all! be entreated to consider the infinite value of health—of life—and the proportionate importance of its preservation and augmentation! Weighed in the scale with health, millions are trash, and all else is dross without it. Gain whatever you may by impairing health, you become an infinite loser; but lose what you may in its preservation or restoration, you gain more than to acquire fortunes, and even crowns and worlds! Be your aims what they may, if you would succeed, preserve HEALTH FIRST.

To get rich, PRESERVE HEALTH.

To enjoy animal life, PRESERVE HEALTH.

To do good, PRESERVE HEALTH; for what good can you do when sick or dead?

To acquire knowledge, PRESERVE HEALTH.

To attain any kind of eminence or greatness, PRESERVE HEALTH.

To secure any or all the legitimate ends of life, physical, intellectual, or moral, PRESERVE HEALTH.

Let then the PRESERVATION of health be the great concern—the PARAMOUNT BUSINESS—of life, as it is the perfection of wisdom and the great instrumentality of enjoyment.

24. SICKNESS AND DEATH NOT PROVIDENTIAL, BUT GOVERNED BY LAW.

"O! but," says one, "health and sickness, life and death, are wise but mysterious dispensations of PROVIDENCE. 'The LORD killeth and maketh alive; HE bringeth down to the grave and bringeth up.' Our days are all numbered, so that we MUST die at our appointed time." Do we live in a world of law, or of chance[567]? Does every effect have its cause, and every cause its effect, or do the most important of all effects occur without cause[542 548], by "Providential interposition," perhaps in the very teeth of causation? Does God violate his own laws? Preposterous! A doctrine false in fact, injurious in consequence, subversive of all causation, conceived in ignorance and brought forth by bigotry! Our world is governed throughout BY LAW. All is cause and effect. We SEE, FEEL, AND KNOW that SOME causes promote health, while others retard it. Certain causes always occasion death, and others often avert it. If sickness and death are providential, why ever give medicine to remove the former, or prevent the latter? What! vainly, and impiously attempt to arrest by medicine the dispensation of an all-wise Providence! Fear and tremble lest He smite you dead, for giving medicine to thwart His unchangeable decree! Irony aside, sickness and death are no more providential than the rising of the sun or any fixed operation of nature, but the legitimate and NECESSARY EFFECTS of their procuring causes; nor do any consider them practically as providential, but all treat them as effects in their very attempts to obviate them by removing their causes. All mankind DO something—apply CAUSES to the relief of pain and prevention of death, as spontaneously as they breathe. What stronger evidence could be required or had, that all instinctively FEEL AND KNOW them to be EFFECTS governed by causation? Are deaths caused by poisoning or shooting provi-

dences? Then all the operations of nature are equally providences. You may call them CAUSED providences; I call them effects. We often know by what causes sickness and death were produced, and are all internally conscious—the highest order of proof—that they are effects, equally with all the operations of nature. To argue this point is to argue what is self-evident, and to suppose that a single glow of health, or twinge of pain is not an effect, but a providence, is supposing that this incalculably important department of nature is without the pale of causation and law—a doctrine utterly untenable. His Causality must be feeble, and mind weak or unenlightened, who entertains a doctrine thus hostile to all order and to universal nature.

Nor is the doctrine that they are sometimes providential, and sometimes caused by violating the organic laws, less irrational than to suppose the sun rises one day in obedience to the fixed laws of gravity, and another day by 'special providence,' and wholly without means; and thus of all the other fixed operations of nature. Does Deity trifle thus? Does He half do and then undo? Does He ever begin without completing? Does not that same utility and even constitutional necessity of things which renders it best that sickness and health, life and death, should be caused in PART—as we know they are—should also be caused IN WHOLE? The principle that whenever a part of a given class of operations, as of seeing, motion, and the like, are governed by causation, that entire class is governed by the same law, is a universal fact throughout nature [17]. That causation governs sickness and death in part, is self-evident: therefore all sickness, all death, premature and natural, are equally the legitimate and invariable effects of violated physical law. In one sense they may be called 'divine chastisements,' because they are chastisements consequent on breaking the Divine laws, but in no other. Both reason and fact impel us to this conclusion. No middle ground remains. In fact, no ground but to ascribe all health and sickness, life and death, to inflexible causation. Strange that moral and intellectual leaders and teachers—pseudo EDUCATED men even—should entertain and promulgate a

doctrine as injurious and utterly absurd, as that sickness and premature death can possibly be providential, or occur unless caused by some violation of the organic laws! Men kill themselves, and parents their children—with kindness often—by countless thousands, and then essay to throw off all the blame from their own guilty selves by ascribing all to "Providence." Consummate ignorance. Even downright blasphemy! Though the sick may be consoled by being clerically exhorted to "submit to this afflictive dispensation of Divine Providence, trusting that this chastening rod of your Heavenly Father will teach you resignation to his will," more than by being reproved for inflicting this distress upon themselves, and occasioning this trouble to others, consequent on disobeying the laws of health, yet the latter course would tend to prevent SUBSEQUENT sickness by inculcating subsequent obedience. Though for clergymen to tell parents, on the death of beloved children, "'The Lord gave and the Lord taketh away,' probably from evil to come—that this bereavement is a merciful 'Providence' sent to wean your affections from earth, and prepare them for heaven,"* and the like, may comfort their lacerated feelings

* 25. TO BE WEANED FROM THE WORLD

Is to be weaned out of it. Are we not created and adapted expressly to enjoy it? Suppose us wholly weaned, say from property, we should neither earn nor save a single thing, and thus soon become utterly destitute of all earthly comforts. Such weaning is WICKED. Weaned wholly from family, we should see them perish by wretched inches, without lifting a finger for their relief; which, not weaned, we should gladly proffer. Weaned on the score of appetite, starvation would be the fatal consequence; and thus of every earthly enjoyment. Great preparation for heaven this being weaned from earth! Does enjoying this life, that is, obeying its laws, unfit for heaven? Are earth and heaven thus in necessary collision? Rather, has not our benevolent Father HARMONIZED the two? Is not the doctrine that they conflict a virtual impeachment of His wisdom or goodness? Rather, it is a heathen relic of that barbarous notion, that human agony is God's delight, and insures his favor—a doctrine at universal war with every adaptation of nature.[1] That God is best pleased when we are most happy, nature teaches us universally and PRACTICALLY; thus assuring us that the best possible preparation for another life consists in obeying the laws of this; that is, in rendering ourselves as happy as possible in this; whereas, that whatever renders us unhappy

temporarily; whereas, telling them that this death was the painful consequence of some violations of the law of health, and could have been prevented by their observance, might temporally increase their sorrow, yet the latter course would tend powerfully to secure subsequent obedience, and thus prevent farther bereavement and suffering; whereas, the former facilitates both by blinding their eyes to the real cause of their calamity. Fully to realize that nothing but VIOLATED LAW can possibly occasion sickness or premature death, especially juveniles, will enforce, by the most powerful of all motives, the study and observance of those laws, and thus ward off sickness and preserve life, while these false consolations lull parents and destroy children by scores of thousands annually. On this point hear Mrs. Sedgwick.

"WAS IT PROVIDENCE?

"Take, for example, a young girl bred delicately in town, and shut up in a nursery in her childhood—in a boarding-school through her youth—never accustomed to air or exercise, two things that the law of God makes essential to health. She marries; her strength is inadequate to the demands upon it. Her beauty fades early. She languishes through her hard offices of giving birth to children, suckling, and watching over them, and dies early. 'What a strange Providence, that a mother should be taken in the midst of life from her children!' Was it Providence? No! Providence had assigned her threescore years and ten; a term long enough to rear her children, and to see her children's children; but she did not obey the laws on which life depends, and of course she lost it.

"A father, too, is cut off in the midst of his days. He is a useful and distinguished citizen, and eminent in his profession. A general buzz arises on every side: 'What a striking Providence!' This man has been in the habit of studying half of the night; of passing his days in his office or in the courts; of eating luxurious dinners, and drinking various kinds of wine. He has every day violated the laws on which health depends. Did Providence cut

here, as does grief for the loss of children and friends, violates the laws of earth and thereby unfits for heaven. A preparation for heaven, so far from weaning us from earth, or diminishing our terrestrial enjoyments, consists in rendering ourselves as perfectly happy on earth, and as perfectly attached to its enjoyments, as is possible. Earth and heaven are not antagonistic enemies, but are children of the same benevolent Parent, and in universal alliance.

him off? The evil rarely ends here. The diseases of the father are often transmitted; and a feeble mother rarely leaves behind her vigorous children.

"It has been customary in some of our cities, for young ladies to walk in thin shoes and delicate stockings in mid-winter. A healthy, blooming young girl thus dressed in violation of Heaven's laws, pays the penalty—a checked circulation, colds, fever, and death. 'What a sad Providence!' exclaimed her friends. Was it Providence, or her own folly? A beautiful young bride goes night after night to parties, made in honor of her marriage. She has a slightly sore throat; perhaps the weather is inclement; but she must go with her neck and arms bare; for who ever saw a bride in a close evening dress? She is consequently seized with an inflammation of the lungs, and the grave receives her before her bridal days are over. 'What a Providence!' exclaims the world. 'Cut off in the midst of happiness and hope!' Alas, did she not cut the thread of life herself?

"A girl in the country, exposed to our changeful climate, gets a new bonnet instead of getting a flannel garment. A rheumatism is the consequence. Should the girl sit down tranquilly with the idea that Providence has sent the rheumatism upon her, or should she charge it on her vanity, and avoid the folly in future? Look, my young friends, at the mass of diseases that are incurred by intemperance in eating and in drinking, in study or in business; by neglect of exercise, cleanliness, and pure air; by indiscreet dressing, tight-lacing, etc.; and all is quietly imputed to Providence! Is there not impiety as well as ignorance in this? Were the physical laws strictly observed, from generation to generation, there would be an end to the frightful diseases that cut life short, and of the long list of maladies that make life a torment or a trial. It is the opinion of those who best understand the physical system, that this wonderful machine, the body, this 'goodly temple,' would gradually decay, and men would die as if falling asleep."

26. HEALTH ATTAINABLE—SPONTANEOUS.

NOT only is it governed by laws, but its laws are within our reach[9]. Nor are they difficult of application. Such application is even SPONTANEOUS. To preserve health, we have neither to visit some distant clime, nor to do some great thing, nor even to practice the least self-denial, but only not to PREVENT it. Let nature "have her perfect work," and she will furnish it already at our hands. Perfect health is simply the perfect operation of all her organs and functions[20]. This she has taken the utmost pains to secure. Behold the labor she has bestowed to construct the body with a degree of perfection

attainable only by infinite skill and power. These organs thus infinitely perfect, are their functions less so? Was not this perfection of structure devised expressly to secure corresponding perfection of function? Else what its use? Unless deranged or prevented by violating law, every organ will go on from the beginning of life until worn out by extreme old age, to perform its office with all the regularity of the sun, and with a power commensurate to any demand compatible with the laws of our being. To argue our doctrine that health is SPONTANEOUS—as natural as breathing, or eating, or sleeping, is in fact only these and other functions in their natural and vigorous action [20]—is to attempt to prove an axiom, or that we see what we see. Allowed their natural play, all the organs will go on perpetually to manufacture life, health, and happiness, which, unless their flow is arrested by violating law, will flow on as freely and spontaneously to every human being as the river to its own ocean home. An illustrative anecdote.

A boy once inadvertently whistled in school. "John, you rogue, what made you whistle?" inquired the angered teacher. "I didn't, master," replied John, "it WHISTLED ITSELF." It breathes itself, sees itself, moves itself, sleeps itself, digests itself, thinks and feels itself—EVERY THING ITSELF—and breathes, sees, thinks, feels, every thing, exactly RIGHT, unless prevented, if the proper food and stimulus be presented. Is it difficult to breathe? or to breathe right? or enough? or wholesome air? Rather, it is exceedingly difficult NOT to breathe, or to breathe too little, or a noxious atmosphere. Is it hard to eat? or to eat enough? or to eat what is healthy? Yet the converse is always difficult. These illustrations apply to every function of the body. Every organ is constituted to commence its normal and healthy action from the first, and perform it spontaneously throughout life; and that to a much greater age than any now attain. Indeed, it requires great, or else long-continued VIOLENCE to arrest their healthy and pleasurable functions at any time between birth and death. Hence, there is no more need of our becoming sick, or of these functions becoming enfeebled or disordered, than of our shutting our eyes for weeks together,

or refusing to breathe, or move, or preventing any other function by force. The power of the human constitution to resist disease is perfectly astonishing. How many readers have abused their health outrageously, hundreds of times, with comparative impunity; and even after they have thus broken down their constitutions, have still endured sickness and suffering till they wonder that they are alive? What would your health now have been if you had promoted instead of abusing it? How much you could once endure? How many hardships go through? How much it took to break you down? Nor do any of us realize how much we abuse our health. Every day and night, and almost hour, we do something more or less detrimental to health—stay in-doors too much; or remain much in heated rooms; or exercise too little; or else labor too much, or not exactly right; or sleep in close rooms; or eat too much, or what is injurious, or at least a diet less beneficial than other things we might eat; or over-tax the mind; or perhaps exercise it too little; or sit in an unwholesome posture; or neglect the skin; or dress too warm; or take cold; or one or another of those ten thousand kindred things, more or less injurious to health, which all perpetrate daily, and almost perpetually. All this, in addition to those extreme imprudences of which almost all are more or less guilty every little while. Yet, in spite of all this abuse of health by all, see how healthy many continue to be, often for eighty or a hundred years. Alcohol is rank poison to the human constitution, yet see how many will drink it daily, and often to drunkenness, for thirty, and even fifty years, without destroying their health, though they greatly impair it. See what poisonous drugs some will take, yet live through it. In short, nature has done her utmost to bestow vigorous and uninterrupted health on every member of the human family, and to ward off disease and prolong life. Behold and wonder at the physical stamina and energy provided for by nature, and then say whether every human being is not constituted for health. Even admitting that children often inherit diseases from parents, yet the fact that parents have health sufficient to become parents, is abundant proof that their offspring, by a careful ob-

servance of the laws of health, can ward off the inherited predisposition, and enjoy excellent health to a good old age—a point fully established in "Hereditary Descent," stereotype edition, and confirmed by the fact, to be established in this volume, that all diseases, taken in season, can be warded off by a correct physiological regimen. All can therefore preserve health and escape disease.

27. HEALTH A DUTY: SICKNESS AND PREMATURE DEATH SINFUL.

Since, therefore, health is attainable—is even spontaneous—and can be destroyed only with difficulty, and especially, since it is thus infinitely valuable[21], is it not the solemn and imperious DUTY of all to preserve it if good, and regain it if impaired? If not, then there is no such thing as obligation; because we can discharge no duty—accomplish no end—without it, and only in proportion to its vigor. Is it not our duty to do good, worship God, love and provide for family, reason, enjoy the bounties of nature—in short, to exercise all the powers and faculties God has graciously bestowed upon us? Unless it is sinful to impair these divine gifts by debility, or bury them in a premature grave, then nothing can be sinful. And is it not our duty to give our fellow-men pleasure instead of pain? Is it not then WRONG to subject them to all the care and weariness of watching around our sick bed, and to all the anxiety consequent on our sickness? And is it not most wicked—almost the climax of crime—to break down the spirits of dear friends, especially of our own families and companions, with anguish by our death, whereas we might, by obeying the laws of health, gladden them with our friendship, support them by our labors, sustain them by our sympathies, and guide them by our counsels?

The pain accompanying disease and death, constitutes the highest order of proof that they are sinful; because no pain can ever exist except induced by violated law[5 6], and violating law is sin itself. Avoid sinning and you escape suffering, but all suffering is the consequence of sinning[6]. The very painfulness of sickness is therefore the witness of its sinfulness. Sickness is caused by violating the laws of health. Such

violation—ALL violation—of law is WRONG. Therefore all sickness is sinful, and the consequent pain is its penalty. Health is the ordinance of nature—a fulfilment of the organic laws—as well as the great instrumentality of every other duty, and therefore our first and highest duty to our fellow-men, ourselves, and our God—to our fellow-men because we cannot discharge our obligations to them without it, and if sick, we wrong them by occasioning them pain; to ourselves because we can perform no duty [21], and enjoy no blessing [1], without it; and to our God because we are under the most imperious obligation to obey His laws, those of health of course included. Ye who demur, say what "DIVINE RIGHT" have you to violate God's laws? Show "indulgences" from the court of heaven, granting permission to trample on divine ordinances, or else admit such trespass and its consequent sickness to be wicked.

Premature death is still more sinful, because occasioned by a still greater violation of law—is indeed the chief of crimes. Is not suicide most wicked? Yet it consists in the same breach of these same laws, which, broken, cause premature death. As to shorten life by self-murder, is a sin of the highest grade, so to shorten life by injuring health, is equally wicked, because both result precisely alike, namely, in the destruction of life, and by similar means, namely, a breach of the same laws. Unless we have a "divine right" to COMMIT SUICIDE, gradual or sudden, we have none to incur premature death; and inasmuch as suicide is most heinous, by so much, and for precisely the same reason, is it equally wicked to induce death by the careless exposure or wanton injury of health. The extreme painfulness, too, of premature death, is nature's proclamation that its cause is proportionately sinful [6]. Fraud, robbery, and the like, are as trifling sins in comparison to the destruction of health, as life is more valuable than property; and thus of other crimes.

"But," objects one, "how can we HELP dying when death comes?" We have already shown that it will never come, unless when summoned by violated law, till old age folds us up gradually in a natural and therefore pleasurable decline, after we have no more desire for life, or dread of death [26]. It

is high time that sickness and premature death were considered to be what they really are—high-handed CRIMES, against humanity, against Divinity.

Exceptions, of course, occur wherever persons become sick or are killed by unavoidable accidents, earthquakes, and the like, or by their fellow-men, they being guilty when their carelessness occasions such accidents, or they destroy life by intent. Yet the guilt is not obviated by being transferred from the sufferer to the perpetrator. The same holds true where parents occasion the sickness or death of children by confinement, improper regimen, extra tenderness, pampering their appetites, administering poisonous medicines, and the like.

The preservation of health then becomes both our glorious PRIVILEGE [26], and our imperious DUTY [27]. We should therefore STUDY THE LAWS of health, and then implicitly obey them—should make obedience to the conditions of health a matter of CONSCIENCE, and feel GUILTY when unwell; and repent and reform. We should allow neither business, nor supposed pleasures, nor duties—NOTHING WHATEVER—to infringe upon its perfection, but make health PARAMOUNT—should sacrifice business, property, society—EVERY thing—upon the altar of this HIGHEST BUSINESS AND DUTY OF LIFE.

The preservation of health being then both possible, and our imperious and paramount duty, and sickness and premature death being thus the climax of crime, and also avoidable, therefore the MEANS by which we can secure the former and prevent the latter become the highest object of human inquiry. To this inquiry our subject now brings us.

CHAPTER II.

FOOD.

SECTION I.

ITS NECESSITY, SELECTION, MASTICATION, AND DIGESTION.

SINCE health consists in the normal and vigorous action of all the physical functions [20], its preservation of course consists in their preservation, and its restoration in their restoration;

nor is any thing else required either to perpetuate health, eradicate all forms of disease, and prolong life to "green old age"—a means as simple as the end is important[21]. What, then, are some of these functions, and by what means can they be preserved when vigorous, and restored when impaired?

23. MAN'S REQUISITION FOR VITALITY.

Man—all animal being—is so constituted that every function of life—every exercise of muscle, nerve, and organ, all we say, do, and are, all the operations of our entire and complicated mental and physical nature EXPEND VITALITY. As no machinery can be propelled without consuming that power which impels, so that wonderful mechanism which manufactures life, mind included, cannot move one iota, in whole or in part, without thereby WORKING UP that vitality or animal energy which constitutes its motive principle. And since life consists in a vast variety and complication of functions, some of which are often most powerful and intense, of course its consumption of vitality must be proportionally great, even though individual functions should expend but little. And this consumption of vitality is in the exact ratio of that life which it produces, because the latter CONSISTS IN the former. And as we sometimes think, feel, do, and therefore LIVE more in one hour than at other times in ten or twenty hours, we of course consume vital energy proportionally fast. Moreover, all these functions are performed with as much more rapidity and efficiency when this supply is abundant, than when it is reduced, as machinery does when the "head" of steam or water is great, than when it is low; and for a kindred reason. Except in cases of corpulency, we think, feel, perform, and therefore LIVE more or less easily, vigorously, and effectually in proportion as this supply is abundant, and become enfeebled in proportion as it declines.

It is therefore perfectly obvious that unless this great and constant consumption is re-supplied, exhaustion must inevitably follow, which of course proportionally reduces life, and if carried too far, suspends it altogether.

From what sources, then, is this re-supply derived? Of what manufactured, and how augmented, that we may know how to keep this "head" of vitality always "high?"

29. REQUISITION FOR FOOD.

Man is an EATING animal. Food is indispensable to animal growth and tissue, and to that terrestrial manifestation of mentality connected therewith [11]. It furnishes an element absolutely necessary to nutrition and vitality. The second thing we instinctively do on entering the world, is to seek ALIMENT. The MATERIAL department of man's nature—bone, muscle, nerve, organs—is subject to a perpetual waste of those materials of which it is composed—a waste computed to equal one-seventh of the entire body annually, and to the whole of it every seven years, but probably much greater than this; which waste must be re-supplied by properties eliminated from food by the process of digestion. This waste unsupplied, as when food cannot be obtained, or is not digested on account of sickness, the subject becomes emaciated, perhaps wastes away almost to "skin and bones," and looks and feels haggard, ghastly, and "gone;" his strength fails, spirits sink within him, and life ebbs away till it takes its final exit. Famine is indeed a "weary thing" to endure, and fatal in its effects on mind and body; because it deprives the system of elements indispensable to life. So craving is the demand for food, that, when it is not supplied, and digestion is good, the fatty matter is all taken up by secretion, and emptied into the circulation; then muscular, nervous, cerebral, and other tissues follow, until this consumptive process is arrested by death. Hence the gaunt, meager aspect of consumptive and dyspeptic patients. Hence, also, fat or indolent persons can endure famine better than lean or active ones, because the corpulent have more to live upon than the spare, and the active live the fastest [28].

All should therefore see to it that they furnish the system with all the food it requires. Starvation is even certain and speedy RUIN. Few can live without food more than from twenty to twenty-five days, and most become debilitated, even

to insensibility, in a much shorter time, and are usually rendered faint by fasting a single day, or omitting only one meal, or even not eating at the usual time.

This demand for food being thus imperative, and too obvious to require additional remark, we proceed to inquire concerning its re-supply.

30. ORGANIZED BODIES ALONE EDIBLE.

Vegetable nature is constituted to draw its nourishment directly from the earth. Not so with man. His nature imperiously demands that his food should consist of substances already organized, because inorganic bodies do not contain the requisite material. Nor are such bodies wanting, but abound in any required quantity and variety. Open our eyes wherever we will, upon surrounding nature, we behold not only a vast variety of "four-footed beasts and all manner of creeping things," but also a vast array and variety of vegetable esculents and fruits, delicious to the palate, and laden with nourishment for the body. A boundless range of edibles is thus spread out broadcast before man, from which to make his own selection. Nature neither restricts him in variety, nor stints him in quantity; but says to all, "Arise; prepare and eat." Our subject thus brings us naturally to the

31. SELECTION OF FOOD.

As some species of the vegetable kingdom flourish in particular kinds of soil, but in no others, that is, require particular kinds of sustenance, so some species of the animal kingdom are adapted to live on particular kinds of food, and flourish on no other. Thus whales fatten on the squid, while lions, tigers, and beasts of prey have a natural aptitude for animals just killed, whereas herbiverous animals loathe flesh and thrive best on a vegetable diet, and particular species of the former on given kinds of the latter. Nor can the carnivorous tribes subsist—at least not perfect their natures—when fed exclusively on herbage, nor the sheep live on raw flesh. That certain species of animals are constitutionally adapted to

subsist on particular kinds of food, is both self-evident, and a beautiful provision of nature by which to feed a far greater number than could otherwise find subsistence.

The lower the order of animal, moreover, the lower the grade of its food. Thus the squid, an exceedingly stupid and flabby animal, and so soft in texture that it can be kneaded into a homogeneous mass by hand, feeds on a slimy organization of the lowest grade, and in its turn feeds the whale, the texture of which is much higher and stronger. Animals which feed on carrion, as the jackall, turkey-buzzard, and the like, fill a place in the scale of intelligence and power much lower than the lion, eagle, etc. The mastodon was—perhaps still is—endowed with a most extraordinary amount of power, and accordingly fed on browse, the texture of which is more dense and firm than probably anything else eaten. Vegetable life is lower in the scale of being than animal, and draws its sustenance directly from the earth, which animals cannot do. Monkeys are adapted to live on fruits, nuts, eggs, and the like, an order of food evidently higher than roots, to which the swine is adapted, and accordingly are more highly organized. In fact, all animals are superior to their food, else they could not seize or pluck it, and sprightly animals, as mice, birds, deer, and the like, are food for those still more sprightly, as the cat, eagle, tiger, etc.; while strong or lazy animals feed on what is still less so. Indeed, the natural food of any animal furnishes a correct index of the character of that animal; and the more limited the food of any species the more limited the capacity of that species. So man's range of food embraces the diet of nearly all other animals, and accordingly his characteristics embrace those of the whole animal kingdom.

32. DIFFERENT DIETS FEED DIFFERENT POWERS.

Though man is well nigh omnivorous, yet do all kinds of food nourish him equally well? Is he not, in common with all animated nature, also adapted to live more especially on particular KINDS of food? These questions are all effectually answered by the fundamental law of diet, that particular

kinds of food are constitutionally adapted to develop certain physical and mental qualities, and other kinds other powers. Thus, that the natural diet of the lion and the tiger is constitutionally adapted to develop both their physiology and mentality, and that the natural food of the squirrel, sheep, shark, etc., is every way adapted to feed those very powers possessed by these respective animals, and thus of all other species, is not a matter of opinion, but a law of NATURE, established by the fact that to deprive them of this food is to weaken their powers, and usually destroys their lives. A position thus based in nature's adaptations—always for the best—and thus pervading all her works, is too apparent to require argument, or any more than its announcement, to secure intellectual admission. The simple fact that certain species of animals have an aptitude and adaptation for particular kinds of food, and flourish on these kinds—that the tiger is rendered fiercer by animal food, but loses his ferocity when fed on bread-stuffs—that feeding dogs on raw beef increases their ferocity, and thus of other animals, together with much to the same purpose, and especially the general economy of nature, prove it to be a LAW OF THINGS that certain kinds of food are constitutionally adapted to develop certain powers, and other kinds other faculties.

This provision of nature for increasing particular capacities in man and brute, is exceedingly beautiful in itself, yet still more USEFUL. Besides feeding the various natures of brute and man, it enables us all to augment or restrain particular powers and faculties in ourselves, and thus diminish propensity, while we feed our intellectual and moral powers.

The question then becomes all-important—WHAT kinds of food naturally develop particular physical and mental powers? a question as little understood as it is vast in its influence on human capability, virtue, and happiness. This subject should therefore become the universal study of mankind till he completely understands it in all its various ramifications, and knows just what to eat and drink in order to stimulate or subdue all his physical and mental powers. Though the author does not claim a complete knowledge of this vast and vastly-

important subject, yet he proposes to point out its LAND-MARKS, and thus facilitate its general application and further investigation.

33. UNPERVERTED APPETITE AN INFALLIBLE DIRECTORY.

Having thus ordained that particular kinds of food shall develop particular powers, nature has not left man or brute to ascertain by chance, and eat by force, the various kinds best for each severally, either in general, or on special occasions, but has kindly furnished all with an infallible dietetic GUIDE in the natural RELISH of each for the particular kinds required. UNPERVERTED APPETITE will always conduct all to that diet best for them, both in general and on special occasions. This principle constitutes a part of that great arrangement by which nature secures to all the greatest amount of happiness[1]. As law obeyed confers enjoyment[6 7], so fulfilling the laws of appetite, that is, eating those kinds of food best for us, of course yields the highest attainable degree of gustatory pleasure. The very nature of things requires that the diet best for any and all should TASTE best, or else the fundamental principle, that fulfilling law confers enjoyment, fails in this important aspect; which is a palpable absurdity. But since obedience always confers happiness, therefore eating what nature requires of course enhances enjoyment, both gustatory and general. Thus, the lion, tiger, and eagle require animal food just killed, which they accordingly LOVE better than any other, whereas the sheep, horse, rabbit, and the like, thrive best on HERBAGE, for which they have a natural RELISH; and thus of all other animals. Nor can any genus, species, or individual of the animal kingdom enjoy any other than its natural diet, until appetite has become perverted and vitiated; nor live on unnatural food without enfeebling or destroying its peculiar faculties. But all enhance their powers most, as well as enjoy themselves and their food best, in and by living on their natural diet. This principle all animated nature attests, and reason sanctions. Indeed, it is too obvious to require argument or amplification; and of course constitutes an infallible guide in the selection of our food for which all

should devoutly thank the "Giver of every good and perfect gift."

None, therefore, need ever deny their natural appetite, but all should study how they can most completely GRATIFY it, because they thereby promote health and develop their powers in the most effectual manner possible. As that diet IS best which TASTES best, of course whenever the system requires particular kinds of food to supply exigencies, we may rest fully assured that appetite will CRAVE whatever is required, and, by converse, that whatever natural appetite craves the system requires. The doctrine of self-denial, physiology—all nature—utterly repudiates; but, in the matter of appetite, as in every thing else, sanctions, and even requires, SELF INDULGENCE in the highest and most extensive sense. SELF-DENIAL IS SINFUL. SELF-ENJOYMENT should be our universal motto.

Bear in mind, then, ye lovers of good living, that this volume does not come to "choke you off" from any real dainty or luxury whatever of the palate—of life—but to show you how you can the most effectually ENJOY your food—enjoy all the luxuries of your being.

34. APPETITE LIABLE TO BECOME PERVERTED.

But, though natural appetite is a certain guide to the kinds of food, both general and specific, required by man and brute, yet, in common with every other function of our nature, it is capable of being PERVERTED, and then always MISLEADS. Thus, a cow on ship-board, driven at first by hunger to eat meat mixed with vegetables, came at length to relish a flesh diet, and could hardly be induced to return to her natural food. Tigers have been fed on farinaceous food, and many kindred cases of perverted appetite have been known to occur in the animal kingdom. Man's relish, too, can become so perverted as to like and even crave what is most noxious in itself, and injurious in its effects. Of this, a hankering after tobacco, coffee, ardent-spirits, malt-liquors, and the like, among moderns, and the love of the ancients for asafœtida, etc., furnish samples. Indeed, so almost universal is this perversion in civilized life, that probably every reader is its vic-

tim; and hence the popularity of many dishes exceedingly nauseating to natural appetite, and injurious to the system. Though nature tells us plainly what we should eat and what eschew, by implanting a natural relish for the former and aversion to the latter, yet when highly injurious diet is habitually FORCED upon her, she accommodates herself to it as well as she can, and ultimately even partially craves it, yet never enjoys it with that keen gustatory pleasure experienced for her constitutional food. In fact, few have any conception of the amount of table enjoyment which we should all take if our appetites were unperverted. An unnatural appetite and consequent disordered digestion, rob civilized life of that real LUXURY of the palate proffered by nature, but bartered away for the spurious and inferior gratification of modern cookery. Nature's infallible pilot to a healthy diet is thus superseded by artificial and unnatural hankerings—always more craving than natural appetite—the gratification of which induces hosts of diseases and premature death, literally frightful to contemplate and truly horrible to experience[23]. Let us all, then, heed the double warning held out to us by this principle, and bear in mind that we follow the unnatural cravings of our depraved appetites—perverted doubtless in the cradle, if not before—at our peril—to the enfeebling if not destruction of mind and body; and that, by indulging a perverted appetite, we cut off the very enjoyments of the palate sought therein.

This work may, therefore, recommend a system of diet at first less palatable to some than the one now preferred, yet if it recommends NATURE'S system, it, followed, will double and quadruple those very pleasures of the appetite. The author is no ascetic. Pains and penance form no part of his religion or his philosophy. Everywhere the natural is to be substituted for the unnatural—of course the pleasurable supersedes the painful. Nor is even the breaking off of abnormal habits, or the formation of correct ones, necessarily a self-denial, but even a PRESENT as well as subsequent pleasure. The doctrine of our first paragraph is a fundamental LAW OF THINGS, applicable universally, and renders returning from transgression not necessarily painful, but constitutionally pleasurable; for

if obedience itself is pleasurable, why not also returning thereto? As, then, the natural appetite probably of us all is more or less morbid and perverted, it behooves us to ascertain man's constitutional diet, and restore to it its original food, which we shall then relish far better than we now do all the "flesh-pots" of civilization. Thus to sacrifice an unnatural appetite upon the altar of a natural one, is not self-denial, but SELF-INTEREST, and therefore to be eagerly SOUGHT, instead of dreaded. However depraved our cravings, they can be measurably brought back to their normal tone, and this invaluable dietetic guide restored, so that it will conduct us all to the food best for mind and body. Let us, then, turn a deaf ear to the clamors of perverted appetite, and follow where nature leads, fully assured that a change from the artificial to the natural will result in a far higher order of gustatory and general enjoyment than we now experience.

35. THE TRUE ISSUE.

In casting about for the constitutional food of man, two dietetic systems, both capable of sustaining life, are presented to our choice—animal and vegetable. Is man constituted to live exclusively on either? If so, on which? Or is a MIXED diet best calculated to develop all his powers? If so, mixed in what PROPORTIONS? Grave questions these, which natural appetite would answer for us, yet the reply to which perverted appetite compels us to seek elsewhere. But happily nature proclaims her economy in more ways than one, so that, though natural appetite, her best index, is generally perverted, yet she has not left the least shadow of doubt or uncertainty to obscure her answer to these momentous questions.

What, then, are the respective influences on mind and body—on human happiness—of an exclusively animal diet? What of one exclusively vegetable?* And what of a mixed diet,

* By the term vegetable diet, used in this volume, is meant one composed of any or all kinds of grains, gums, fruits, and nuts; of eggs, milk, butter, cheese, sweets, vegetable oils, and all edibles not strictly animal, as well as of vegetables proper The term farinaceous will often be used in a kindred sense.

and mixed in various proportions? In short, what shall we eat in order to attain the acme of human perfection and enjoyment? Though none advocate an exclusively animal diet as best for man, yet its constitutional and general effects on the animal and mental economy will show, by approximation, whether a mixed one is best, and if so, what proportion should consist of meat. What, then, are the constitutional effects of animal, and what of vegetable food?

36. A FUNDAMENTAL PRINCIPLE OF DIETETICS.

We have shown that certain species of animals relish certain kinds of food, and other species other kinds[33]. But WHY? Nature never does any thing for nothing. Some REASON—some beneficial END—characterizes all her operations. Then what object does she attain in thus diversifying the diet of the entire animal kingdom? Evidently the more perfect NUTRITION of each and all. This conclusion conforms with that general fitness and appropriateness which obtain throughout all nature does and requires. Does her economy observe this fitness throughout all the rest of her works, and yet fail to adapt the natural diet of the lion, tiger, shark, horse, swine, squirrel, and all other animals, to the sustenance of their respective natures? Would grass nourish the physiology and mentality of the hyena, eagle, and whale, or flesh the sheep and ox, equally as well as the converse now does? Is not flesh adapted to sustain the natures of carnivorous animals, herbage that of herbiverous, nuts of the rodentia, insects and grain the winged, and thus of all that eats? Else why their respective APTITUDES for their natural diets? What stronger proof could be required or had that the natural food of all animals is constitutionally calculated to nourish their respective characteristics, mental and physical, than that furnished by this law of adaptation? To argue a principle thus self-evident, the truth of which is guarantied by nature's universal economy, is like arguing an axiom; yet, as it constitutes a universal dietetic guide, every doubt of its correctness should be obviated.

If additional proof of this fundamental law, that the natural diet of all animals is constitutionally adapted to feed the

respective qualities of those animals, is desired, it is to be found in the fact, that the food of all animals bears a close resemblance to the natures of those animals which feed on it. Thus, sprightly animals generally live on a sprightly diet; as the cat on mice, the tiger and lion on the antelope, etc. Tall animals, as the giraffe, mastodon, and the like, live on what grows high, and moles on what grows close to or in the ground. Fish live mostly on what swims, and the swallow on flying insects, whereas birds which fly less live more on worms and seeds, till we come down to domestic fowls, which fly little, and live mainly on what does not fly. The natural diet of swine is mainly roots—a coarse animal feeding on coarse food. Strong animals, as the mastodon, moose, elephant, and the elk, live much on the ends of limbs—about the firmest food eaten—while horses and cattle relish hay, which is fibrous and tough, as its consumers are hardy and muscular. Sharks, the strongest and fleetest of fish of their size, feed on other fish next in speed and strength to themselves. Monkeys, confessedly the highest order of animals except man, feed on fruit and nuts, obviously the highest order of vegetables except grains and the first class of fruits—reserved for man. The nutrition of nuts, too, is highly concentrated, and their structure very dense. Mark one more universal illustration of this law. Animals are confessedly higher in the scale of capacity and enjoyment than vegetables, and in accordance with our principle, must feed on what has already been organized[30]; whereas vegetables, being lower in structure and function, can sustain themselves by a far lower order of nourishment—one drawn from the earth, organized too low to support animal life. And, in general, the higher the grade of any animal, the higher the order of its food. Even the vegetable kingdom observe this law of correspondence with their food. Thus the grape, an exceedingly juicy fruit, seeks a wet location, and so do pears and plums, whereas apples, less juicy, thrive best on dry soils. Though apparent exceptions may perhaps be cited, yet the general law is perfectly obvious, that there is something in the natural diet of all that eats or grows peculiarly adapted to sustain both the physical and mental characteristics of its consumer.

We might fortify this position by almost any amount of evidence, but respectfully submit, whether it is not so palpably and universally a law of things as to render additional proof superfluous. Who can doubt its being a simple yet effectual means by which nature develops the physiology and mentality of all that eats ?

This fundamental principle of dietetics constitutes an infallible answer to that momentous question, "What shall we eat ?" "What kind of food will develop particular powers of mind and body ?" Since the natural food of the tiger is constitutionally adapted to develop the characteristics of the tiger, and that of the sheep the disposition of the sheep, and thus of all other animals, therefore man has only to live on the natural diet of the tiger, or the horse, or the monkey, to develop in himself, only in a far higher degree, the particular faculties which predominate in these respective animals; and thus of any and all others. Here is nature's fundamental dietetic law, and man's great dietetic guide—as plain, as infallible, as God could render them. We proceed to their more detailed applications.

37. ANIMAL FOOD EXCITES PROPENSITY.

That the constitutional effect of animal food is to excite the animal propensities more, relatively, than the moral sentiments and intellect, is established by the natural history of the entire animal kingdom, and by the universal experience of mankind, both in masses and individuals. As the natural diet of all animals is constitutionally calculated to develop their respective natures[36], and as the paramount characteristic of all carnivorous animals is rapacity and ferocity, therefore animal food, eaten by man, naturally and necessarily develops a like rapacious fierceness in him also; whereas a vegetable diet is constitutionally adapted to foster docility and goodness. If any do not like this result they cannot get by that law in which it is based, that the natural diet of all animals is constitutionally adapted to sustain the peculiarities of their respective natures[36]. Re-read that section attentively, and see if it does not imbody an ordinance of nature. Scan its logic,

scrutinize its bearings, and especially its harmony with nature's adaptations, and see whether the principle it contains does or does not express a dietetic law. If not, then this our inference might possibly be fallacious. But if that principle be true—and that it is so, all eating nature attests—then this necessary consequence, that animal food constitutionally develops Combativeness and Destructiveness mainly, is an ordinance of nature; so that man cannot eat flesh without developing ferocity. Perverted appetite may remonstrate, but nature will not hear such croakings, but sternly executes her inflexible decrees; and man secures his own interests when he conforms to her ordinances.

This doctrine that flesh-food constitutionally excites ferocity is still farther established by its being necessary in the killing of food. The very existence of carnivorous animals depends upon and requires this ferocity. Without it their sharp claws, hooked tusks, and powerful muscles—all adapting them to pounce upon and slay their prey—would be as useless as swords accompanied with cowardice, or lions and tigers without Destructiveness. What could a sheep do with claws and tusks? Would nature create these instruments of death without also creating predominant Destructiveness to accompany them? Destructiveness and a flesh diet are as universal concomitants as fire and heat; else nature is not adapted to herself; nor can they be separated without destroying both.

Nor is this concomitance of propensity and flesh diet proved by this adaptation merely; it is still farther established by FACTS. How frightful the roar of the chafed lion? How terrific the horrid yell of the exasperated tiger?—only expressions of their terrible Destructiveness. You provoke them at your peril. Remains there a reasonable doubt that warm blood and raw flesh, yet quivering with life, are constitutionally adapted to enhance animality? Does not this concomitance carry its warrant upon its very front? Animal food, therefore, stimulates animal propensity.

FACTS—those stubborn way-marks of first principles—also still farther attest this concomitance. Thus, take a dog, about medium for crossness, and feed him for months or years on

vegetables alone, and you increase his docility; but feed him exclusively on raw flesh, and he becomes fierce and dangerous—his Destructiveness being inflamed by a flesh diet, but tamed down by farinaceous food. Hence the known ferocity of butchers' dogs. Slaughter-houses are often left with both doors wide open to air the meat, yet our arrant thieves—by no means wanting in number, Acquisitiveness, cunning, or courage—are kept at bay as effectually as if an unchained tiger guarded the premises. The ferocity of meat-glutted, blood-fed dogs is proverbial. Not so with those fed on vegetables. WHY this known difference? Our principle answers.

But a tiger, caught while young and fed on a farinaceous diet, became so tame that it was allowed to go unchained about the premises, and ate its food from the hand, even after it was grown up. Nor is this taming of the tiger—that fiercest of all animals—by means of a vegetable diet, more extraordinary than its converse of increasing the ferocity of the dog by animal food, which we may all see with our own eyes. Both are counterparts of each other and of the same great dietetic law before us.

38. FLESH EATERS CONTRASTED WITH VEGETABLE EATERS.

"Admitted," says one, "that animal food stimulates the propensities of beasts more than vegetables, yet is this true of MAN?" Quite as true as of animals. The ancients, in training their public fighters for their bloody arenas, in which strength and ferocity were mainly required, fed them chiefly on raw flesh, and at the fiendishness thereby produced, all after ages have been and will be astonished. Diversified experience taught them that there was something in the diet of the lion and the tiger which kindled in the man a ferocity like that which predominates in beasts of prey.

This experiment of the ancients might seem too restricted for our reliance if it had not been tried, in every variety of modification, over and over again thousands of times, on the largest and most extensive scale imaginable, from the earliest records of humanity to the present time. Contrast the peaceable, life-sparing Egyptians, throughout their entire history,

with the animal and man-slaughtering Jews. The former considered the killing of animals to be a great crime, the latter, a religious ordinance. The former ate little or no meat, and were amiable and harmless, instead of warlike and cruel, throughout their entire history. The latter, from pastoral Abraham, and Isaac, and Jacob, were shepherds throughout all their generations, and lived mainly on the flesh of their flocks, besides slaughtering immense herds of cattle and sheep on their altars, and then consuming the greater part of their sacrifices for food; and a more bloodthirsty race is not on record. Look at their David, truly, "a man of blood"—at their ravaging wars, internal and external, throughout their national history; and last, but not least, at the terrible carnage which accompanied their final overthrow. Was ever the "trump of war" sounded, from the time Abram armed "his own household" and slaughtered five kings at once, till the destruction of Jerusalem, without being catched and resounded, and again re-echoed throughout hill and dale, till it swept the entire land, and brought together old and young, in martial array, eager to rush upon the field of deadly combat? And is there no relation between this peaceable character and vegetable diet of the Egyptians on the one hand, and the carnivorous diet and bloodthirsty disposition of the Jews on the other? especially since a flesh diet is constitutionally promotive of ferocity, and a vegetable of docility[37].

The Greeks and Romans, too, ate meat in abundance, and the terror of their arms attest a corresponding ferocity of temper. The ancients generally lived on animal food, and accordingly were exceedingly warlike. A similar contrast of those who inhabit the middle and northern latitudes, who generally eat meat freely, with the inhabitants of the tropics, who eat little flesh, conducts us to similar conclusions.

But we need not look to other climes or eras for "confirmation strong as holy writ," of our doctrine, that animal food excites propensity, especially Destructiveness. Savages generally live mostly on meat; hence, to a great extent, their savage disposition. The warwhoop Indian lives mainly by the chase, and behold his unrelenting revenge. See him bury his

teeth in the live flesh of his captured enemy, and, tiger-like, suck out his warm blood, exultingly exclaiming, "The sweetest morsel I ever tasted." Hear him pow-wow around his helpless victims, and, fiend-like, torture them by slow degrees to death, by the most excruciating cruelties possible to inflict. Revenge is the food of the soul whenever flesh is that of the body. Savage ferocity is the natural product of animal food. Point to the flesh-eating nation, now or ever, not destructive. And those are most so who live most on flesh. Does not "John Bull's" "roast beef" bear some cause-and-effect relation to his warlike valor on the field of slaughter, as well as to his crusty overbearance at home? Look, in contrast, at vegetable-eating nations. The Hindoo neither eats meat nor loves war; and the Chinese eat but little meat, and are inferior fighters. Hence, their unprecedented numbers. Contrast the amiable Japanese, who eschew meat, and rightly consider the slaughter of animals a sin, with the New Zealand cannibal, who eats little but meat, and even HIS OWN RACE. The fact is no less remarkable in itself than true to our principle, that all savage nations are flesh-eaters, and the more ferocious the more exclusively they live on meat; whereas all humane, docile, good-dispositioned, peaceable nations, live on farinaceous food. As in all carnivorous animals, Destructiveness predominates, in head and character, so all flesh-eating nations have likewise great Destructiveness in organ and disposition, while, as this organ is small and faculty weak in herbiverous animals, so are they also deficient in granivorous nations. And what renders it certain that this difference is caused mainly by diet, in man as well as brute, is, that Destructiveness is the CONSTITUTIONAL concomitant of animal food, and necessary in procuring meat[37].

Animal food also INFLAMES Destructiveness, and renders it morbid as well as large; thus rendering any given amount of it proportionally far more destructive. Thus, this organ is relatively less in the Anglo-American head than in that of the Germans, Scotch, Russians, and many others; yet it is relativeley more EXCITABLE, as evinced by the greater harshness, hatred, and severity of temper, in the former than latter; and

accordingly the former eat by far the greatest proportion of meat. This fact in man corresponds with the increased ferocity of dogs when fed on flesh[37]. Behold how all the different facts and bearings of this great truth correspond with all the others—an irrefutable evidence of its truth. "But," it is contended,

39. "MEAT GIVES FORCE AND STRENGTH."

BRUTE force it does, but of this man has relatively too much already, as we shall soon show. "Would you then," it is farther objected, "have us abstain from flesh, and thus become as pusillanimous as the Hindoos?" But are the meat-eating Indian and Laplander so VERY forcible? What have they ever accomplished—what triumphs ever achieved other than with the scalping-knife and tomahawk? If meat alone gives force, one Indian would master two "pale-faces;" whereas, one white man is equal to a score of red ones. The former eat less meat, yet, under every disadvantage, have driven the latter back and back again, farther and still farther upon the setting sun, till they bid fair—foul?—to exterminate his race. Or is the Indian character in itself so VERY desirable? Rather, is it not, in common with that of all flesh-eaters, hateful? Or are the New Zealanders so very forcible, at least for GOOD? Or the Chinese so pusillanimous, except in war? If China is not forcible in butchery, human included, yet is she wanting in any of the essential elements of energy? Look at her canals, her commerce, and her products, and to call her inefficient is to misapply terms. Knock off those shackles of antiquity which bind her hand and foot to past ages, and she would soon vie with our own nation in energy and productiveness. Or hamper us with fetters of more than three thousand years, and see how every species of public and private enterprise would be held stationary as in a vice. Or feed all China on meat, and you would undoubtedly cripple instead of incite. You might, indeed, render the masses too turbulent to submit to authority—might engender private animosities and foment public rebellions; and by thus changing their government and laws, promote ultimate

energy; yet this effect would be incidental, not legitimate. The turbulence of our ancestors, fostered by flesh-eating, has so changed the governments and institutions of antiquity as to have ultimately substituted our own instead of their druidical, narrow, and restrictive; and we owe our energy to these governmental changes, not directly to meat.

Admitted that meat gives force, yet mark the KIND of force it imparts. Analogous to that of the tiger and wolf—force to dare and KILL rather than to do. Does the lion ACCOMPLISH so much more than the horse? Or is the wild bull so extra tame or feeble? Do not both the strongest and the fleetest of animals live on vegetables? The elephant and rhinoceros eat no meat, yet their muscular power and endurance far transcend those of the lion and tiger. The deer, antelope, and gazelle, feed on herbage, yet distance all flesh-eating animals in the open chase. What flesh-eater is more sprightly and nimble than the gazelle and chamois? Since, therefore, the fleetest and the strongest of animals eat no meat, must man eat it or be weak or sluggish? Or to apply this principle directly to man: Is the Highland Scotchman, who was brought up on oatmeal, and tasted meat no oftener than the moon quartered, so very inefficient? Are the potatoe-fed Irish weak? Can our own beef-gourmands dig or carry more? Try, ye meat advocates. The rice-fed Chinese will outdo "John Bull" and "Uncle Sam," except in shedding blood. So will the herbiverous inhabitants of the Pacific isles. But if man's CONSTITUTION demanded meat, those who fulfilled this ordinance of their natures, would far exceed those who do not; whereas the fact is the reverse, and this proves a meat diet to be unnecessary to strength.

Not that animal food does not develop muscular strength. Carnivorous animals are strong, but herbiverous are still stronger, yet have less propensity. Hence, since meat develops propensity[37], yet is not necessary to either strength or force—since it animalizes and depraves, and thus does a positive damage but not a necessary good—why injure ourselves by its consumption?

40. ISOLATED FACTS.

Candid reader, do these views require additional proof? Are they not in accordance with nature? Is not their sweep so extensive, and their bearing so unequivocal, as to demand the assent of every lover of truth? Can proof be more extensive or diversified? Not that we have adduced it all, but does reason demand more? Yet, partly for the encouragement of the wavering, and partly to finish out our subject, on descending from these ranges of facts to isolated cases, we find similar results. Take, first, a chapter in the author's history. In 1835, he changed his diet from mixed to exclusively farinaceous. Previous to this, his health was in a decline, and he fast verging towards consumption. For a year or more following, he never tasted meat, and never enjoyed as good health before or since. Nor at any other period of his life could he ever perform as much mental labor, or, considering all the circumstances, write as vigorously, as at that period. But the great difficulty of obtaining the diet he wanted, almost compelled him, in his peregrinations, to eat some meat, or else what he regarded as worse. And he exceedingly regrets a partial decline, though for twelve years his consumption of meat has been comparatively trifling; and he designs to render it still less, if not to suppress it altogether; or if he should occasionally eat a little, it will not be from choice, but because rather this than worse.

The experience of R. Goss is still more in point, because more thorough. He has abstained wholly from flesh for eleven years, and finds grievous maladies to which he was before subject, now wholly removed, his strength greatly increased, and state of mind far more happy. He has walked—or rather run—EIGHTEEN MILES IN THREE SUCCESSIVE HOURS and five minutes, and finds no trouble in walking fifty miles per day.

Take Sylvester Graham. Produce the man of his age—over fifty years—as sprightly and young in constitution as he is. Yet he was once a confirmed invalid, and driven to a farinaceous diet as his only salvation from impending death. The author has never seen any one at any age more youthful and

elastic. And he grows younger in constitution as he becomes older in years. Behold the change! See whether another generation does not see him still young in all the essential attributes of youth.

But he is accused of eating flesh. Thus saith floating rumor, but where is the PROOF? If he ate it, some one would step forward with names, dates, and places. We live in a tattling and calumniating age—one that would slander an angel. Besides, Graham is an honest man, and would not betray his friends or belie his pretensions. Thus saith his phrenology, his physiognomy, and his general conduct. I do not believe the charge.

Many of his stanch disciples are living witnesses that meat is not necessary to health and strength. The finest children the author has ever seen—and he has examined professionally, and therefore minutely, many thousands—have never tasted flesh. Look at Graham's farinaceous boy. But his flesh-eating girl, whose regimen her mother insisted on controlling, is in her grave. I wish my own children had never tasted, and would never taste, a mouthful of meat. Increased health, efficiency, talents, virtue, and happiness, would undoubtedly be the result. But for the fact that my table is set for others than my own wife and children, it would never be furnished with meat—so strong are my convictions against its utility. Every thorough vegetable experimenter of whom the author has inquired—and they are many—has borne witness to the beneficial effects of the change from flesh to vegetables. A few who have half tried, have condemned it as injurious; yet such have not supplied the place of meat with the KINDS of vegetables required as substitutes. Meat is also a powerful tonic, and the reaction consequent on taking away this artificial stimulant affected them much as the leaving off ardent spirits, or tobacco, or opium, affects those accustomed to them; and they mistook the consequent prostration for permanent debility, whereas in due time nature would have rallied, and they been the more vigorous from abating the unnatural stimulant. But more on substitutes for meat when we come to treat of animal heat.

To continue with our facts. Determined to investigate this whole subject of flesh-eating to the bottom, and to subject the dietetic principles of this work to the tribunal of facts, tried under all sorts of circumstances, besides inquiring by letter as well as verbally, of all whose experience he thought could shed any light over this mooted subject, and also reading somewhat extensively, he received the following answer to one of his inquiries concerning the

41. EXPERIENCE OF THE BIBLE CHRISTIANS,

A religious sect, one branch of which resides in Philadelphia, and other branches in the old country, whose creed interdicts flesh of every description, and some of whose ancestors, for several generations, have wholly eschewed its use. It runs thus:—

Kensington, Philadelphia, February 20th, 1846.

MR. FOWLER:

MY DEAR SIR—Yours of the 16th instant came duly to hand, and I hasten, with great pleasure, to give you whatever information I can, respecting the physical effects of vegetable diet on human life, and particularly on the lives of myself and those who constitute the little religious community over whom Providence has placed me as their spiritual pastor.

The name by which we are known as a religious society, is that of BIBLE CHRISTIANS. One of the peculiar doctrines of our denomination is, that "Eating the flesh of animals is a violation of the first dietetic law, given to mankind by the Creator, as a guide to moral and physical health." His laws are, like Himself, "The same yesterday, to-day, and forever." To transgress His laws by killing animals as food, we consider sinful, and equally so to drink wine, spirits, or any beverage having the power to intoxicate. In these doctrines you will perceive we fully concur with the apostle; "It is good neither to eat flesh nor to drink wine." So far as I am individually concerned, I may be permitted to add, that since September, 1809, I have so strictly conformed to these principles, that I have not even once tasted of either fish, or flesh, or fowl; nor drank anything intoxicating.

Our little religious society had its commencement in Philadelphia, in the year 1817, and consisted, at that time, of only seven or eight members. By an act of incorporation, granted by the Legisla-

ture of the Commonwealth of Pennsylvania in 1830, it is ordained that "none can be members of the Bible Christian Church but those who conform to the rules, regulations, and discipline of said Church; which rules require abstinence from animal food, spirituous and intoxicating liquors, initiation by Baptism, and partaking of the sacrament or Eucharist." Our present number of members, according to the above criterion of membership, is seventy. Besides these, there are about thirty others, more or less connected with us, who abstain from animal food and intoxicating drinks, but are not yet considered full members. Of our members there are—

2	who have lived on the vegetable system 37 years, now				
	aged between	-	-	-	70 and 80
4	do	do	do	do	60 and 70
6	do	do	do	do	50 and 60
7	do	do	from 20 to 30 years,		40 and 50
21	who have never eaten animal food nor drank anything				
	intoxicating,	-	-	- -	25 and 40
30	do	do	do	do	under 25

During the period between 1817 and 1846, ten persons have, at different times, fallen away from our principles, and returned to flesh-eating, and twelve have died; four of these were children; of the others—

1	was aged	72 years,	abstained	from flesh,	etc.,	36 years.
1	do	65	do	do	30	do
1	do	64	do	do	30	do
1	do	63	do	do	25	do
1	do	59	do	do	20	do
1	do	58	do	do	29	do
1	do	39	do	do } each	10	do
1	do	36	do	do }		

The two last died of puerperal fever.

The ability of our people to work, (for we all belong to the working class, and earn our bread by the sweat of our brow,) is fully equal to the flesh-eating community among whom we live, and in several instances considerably superior. Experience and observation have convinced us that neither flesh nor intoxicating liquors are essential to physical strength, or to the long continued endurance of laborious exertions. In a mental point of view, it is generally conceded that a vegetable and farinaceous diet is more favorable to the development of the intellectual and moral faculties than a flesh or mixed diet.

When the yellow fever broke out at the foot of Market street, in the autumn of 1818, my residence was in the immediate vicinity of the infected district, namely, in Front near Market street. There I continued with my family, while most of our neighbors fled from the site for fear of being affected with that dreaded malady; yet we all continued to enjoy excellent health. The year following our experience was similar. During the period of the cholera, I am not aware that any of our members were in the least affected by that disorder. My duties as a minister frequently led me to the bedside of the sick and dying poor, and often to perform the last obsequies over the dead; yet amidst all these painful duties, the same kind and merciful Providence which "tempers the winds to the shorn lamb," protected and preserved me in the enjoyment of uninterrupted health. You doubtless remember there were many conflicting rumors of opinions among eminent physicans and others, about the propriety of avoiding vegetables and fruits during the continuance of the epidemic. I have no knowledge that any of our members made the least alteration in their accustomed mode of diet during that time, and yet they all escaped suffering from that fatal contagion. In my own family, vegetables and fruits were as freely used as in former seasons, without suffering any inconvenience.

In adopting a vegetable diet, and abstinence from inebriating drinks, our denomination was actuated by religious principle. We believe it to be wrong to take animal life for the purpose of satisfying appetite. This faith is founded on the testimony of the Bible, and when we took this advance we knew comparatively little of the laws of Physiology. We thought that kind of knowledge belonged exclusively to the province of the physician. We have since learned otherwise, and the more we have studied Physiology and Phrenology and become familiar with their laws, in order to enjoy health and improve our race, the more perfectly have we been favored with that invaluable blessing.

I regret that it is not in my power, at present, to give you any satisfactory information respecting the number of our denomination in England, or the nature of their experience. In Manchester there are three churches, in which these views of dietetics are publicly inculcated as a religious duty; and I know many persons in various parts of the kingdom who are advocates and friends of a vegetable diet. I will take pleasure in forwarding your interrogatories to some of my friends there, who, I am persuaded, will be happy in furnishing every information in their power.

You ask for information on the subject of works advocating the vegetable system of diet. I presume you are in possession of whatever is valuable from the American press—Graham, Alcott, Bell, etc., etc. I have already sent you my address, etc., and two or three other pamphlets. I forward you with this, "A System of Vegetable Cookery, etc.," by my friend in Manchester, Rev. Dr. Scholefield. The introduction may probably be useful to you. In a letter received from the Doctor, he informs me that a very useful work is just issued from the London press, entitled, "Fruits and Farinacea the proper food of Man; being an attempt to prove from History, Anatomy, Physiology, and Chemistry, that the original, natural, and best diet of man is derived from the vegetable kingdom:" London, published by John Churchill, Princess street, Soho. 8vo. Price in cloth 9*s*. I have not yet seen the work. There is also a work on "Water-Cure," which has lately appeared in England, that goes strongly against flesh. I know of no other recent publications of the kind you are seeking.

With great respect, I remain,
My dear sir, yours, truly,
To O. S. Fowler, Esq. WILLIAM METCALFE.

The author saw one of this sect in 1839, who was reputed to be the strongest man in Philadelphia. Inquire, reader, at the shrine of universal fact, as the author has done, and you will find the response, whether coming from masses or individuals, to accord with this testimony. When we see that the strongest, the nimblest, and the swiftest of animals, attain their speed and power on vegetables; that man can have all the force, strength, and endurance required, without flesh as well as with it; that flesh heats up the passions—already many fold too strong—and that abstainers are the happier without than with, I repeat, why impair and debase the man by eating the animal?

42. ANIMAL FOOD BLUNTS MORAL SENTIMENT.

For what could the lion, or tiger, or butcher do with active Benevolence or Conscientiousness? Sympathy for their poor victim would effectually prevent its slaughter—would close the jaws of the one, and stay the uplifted knife of the other. Large moral organs in carnivorous animals would starve

them, and in man, unless stifled or perverted, would interdict all destruction of life for food. What well-organized child ever beheld an animal slaughtered for the first time, without almost an agony of sympathy? Or can any highly benevolent adult, especially female, endure the distressing sight, unless accustomed to it? How tender-hearted woman shudders thereat, and shrinks therefrom! Yet she is not unduly sympathetic. This alone brands animal butchery as wicked, because it necessarily violates those higher moral sentiments which constitute no inconsiderable portion of female perfection.

Condensed, the argument is this: Such slaughter blunts those finer moral feelings which should reign supreme——, and therefore violates a fundamental law of man's nature. Of course, all the legitimate consequences of such violation occasion pain[7]. Animal food is therefore injurious, because it can be procured only by violating man's moral constitution. Is God indeed so short-sighted as to render animal slaughter —in necessary conflict with that exalted moral sentiment, Benevolence—essential to human perfection? Can any good come out of violated law? Especially of the highest order of laws—the moral? Is man indeed COMPELLED to violate this moral law, in order to perfect his nature? Must he break one law to fulfil another? Do laws thus clash? Is nature thus in conflict with her own self?

"But brute kills brute. Then why not man kill beast? Has God denied to us a privilege he accords to brutes?" objects one. As those coarsely organized, can do many things which excite disgust and repugnance in those keenly sensitive and fine-feeling, so brutes can do what would shock the keener susceptibilities of humanity. Beasts of prey have little or no Benevolence to violate, and hence violate none when they slay to eat—but fulfil a law. If man had no sympathy for distress—and what would he be better than beast without it —he, too, might prey upon brute and man; but he has, and therefore must not abuse it by butchering inoffensive animals.

Volume two will show that no one faculty should ever be so exercised as to clash with the normal function of any other;

because such conflict necessarily occasions great mental anguish, and violates a moral law. Hence, since the exercise of Destructiveness in slaughtering animals necessarily pains active Benevolence, such slaughter is, of course, wicked. Habit may indeed harden the butcher's Benevolence, till it ceases to remonstrate; yet this leaves him just so far practically destitute of it, and therefore imperfect by the loss of an essential mental element, and sinful in omitting to exercise a faculty which his mental constitution imperiously demanded him to exercise. Nor is it possible to gainsay or resist this anti-killing argument.

"But the flesh-EATER does not kill, and therefore cannot incur this blunting of the moral sentiments," objects one. Exactly the converse. As the "bloody Mary" did not bind the martyrs, nor light the fires of Smithfield, yet signed their death-warrants, and as Robespierre only ORDERED the beheading of the victims of the French revolution, yet both were the virtual executioners; so the flesh-EATER is the real slaughterer, because he gives the ORDER. The butcher is to the slaughtered what the torch-carrier was to the martyrdom of John Rogers, or the hired servants employed to ply the guillotine are to the execution. All these are only the hired AGENTS, whereas the responsibility falls mainly on those who give the ORDER, not who execute it under authority. The butcher kills mainly by proxy. The CONSUMER is the virtual butcher. On him the chief responsibility rests; because he both requires the slaughter itself, and directs its kind, time, quantity, manner—every thing. Unless he demanded, the poor beast would not bleed. He is the "Mary" and the "Robespierre" of the slaughter-house; because every pound of flesh he eats increases the demand, and thus becomes a virtual death-warrant issued against helpless brutes.

Not that the butcher is wholly absolved. He is on a footing with the vender of intoxicating drinks—is a VOLUNTARY doer of wrong. As when two participate in murder, the guilt is doubled, not divided, so the guilt of the consumer does not lessen the sin of the butcher. Both violate nature's laws, and must abide their penalties;—the latter in the de-

terioration of his finer moral sensibilities, and the former in the injury a flesh diet necessarily induces[37 42]. Butchers may be obliging, friendly, talented, and much more that is good, yet their daily occupation COMPELS them to become practically inhuman.* We thus censure their occupation with reluctance, yet truth is "no respecter of persons," nor should its exponents temporize.

To kill animals, also violates Conscientiousness. The RIGHT to life is the highest of all rights, and inviolable; yet is trampled under foot by slaughter. What RIGHT has man to snatch, even from brutes, a prerogative so inalienable? Their deed to life is derived from nature, and should be taken only by its Giver.

"But," it is objected, "brutes were made to SERVE man." Granted; but all admit that man has no right to inflict wanton cruelty on brutes—then how much less to perpetrate this highest possible cruelty?

"But man renders them more happy in feeding and housing them during their life, than miserable in their death;" says another. One would be required to feed and house me a long time, and render me superlatively happy into the bargain, before I should think him entitled to cut off my head[43]; and if animals suffer less in death, they also enjoy less in life, so that the PROPORTION is thus preserved.

* Hence the propriety of that law which, in some places, excludes them from being jurymen, on trials which involve life and death.

† 43. SLAUGHTER-HOUSE CRUELTIES.

† The text condemns, in the strongest manner, those unheard-of cruelties perpetrated on animals while killing them, in order to render their meat less bloody, and more tender. To keep the feet of calves and sheep tied together, in the most painfnl posture possible—tumble them into carts on top of one another—bang them about as if they were so many boxes and barrels—keep them for days together without a morsel of food, and then, after all this living death, to hang them up by the hind feet, puncture a vein in the neck, and let them hang in this excruciating torture, faint from loss of blood and struggling for life, yet enduring all the agonies of death, for six or eight hours;—meanwhile pelting them, to beat out the blood and render the meat tender, with might and main, so that every blow extorts a horrid groan, till tardy death at length ends

44. A FLESH DIET SUBJECTS MORALITY TO PROPENSITY.

We have already seen, first, that animal food unduly stimulates animal propensity[37], and secondly, that it blunts the moral sentiments[42], exactly the converse of what man's perfection and happiness require. He is almost all propensity now—[402 544]. His animality vastly preponderates over his morality and intellectuality; whereas, the governing law of both virtue and enjoyment requires the supremacy of the latter. Since meat constitutionally tends to enlarge and inflame propensity[37], and since this is the very converse of what human happiness and perfection require, therefore a flesh diet is wrong. How despicable the disposition of the tiger, hyena, and shark! Does man require to approximate himself thereto? Would becoming more tiger-like render humanity more perfect? More diabolical, rather! Is predominant propensity human glory and happiness? Would you have your children become more turbulent, quarrelsome, fierce, revengeful, hating, and hateful—more like beasts of prey? Then give them meat. Would you not rather render them more lamb-like, and heavenly-dispositioned? Then feed them on a vegetable diet[32].

We all justly complain of the evils of society. The best of us are bad and depraved enough, and the worst are almost devils incarnate. What but PERVERTED PROPENSITY causes the aggravated evils under which society groans? In what else does depravity consist? Or how can human wickedness and wo be obviated, except by subjugating and purifying propensity by intellect and moral sentiment? Volume two DEMON-

their sufferings with their lives—and all perpetrated on helpless, unoffending brutes—is a little worse than anything else except human murder; yet, is but the legitimate fruits of flesh-eating. Hear the piteous wail of these wretched animals, on their passage from the farmyard to the slaughter-house; see their upturned eyes rolling in agony; witness the desperate struggles, and hear the terrible bellowings of the frantic bullock who apprehends his fate, as he is drawn up to the fatal bull-ring; or even look at the awful expression of all amputated heads, as seen in market, or carted through the streets, and then say whether the slaughtering of animals is not a perfect OUTRAGE on every feeling of humanity—every sentiment of right!

STRATES that virtue and happiness consist mainly in this ascendency of the higher faculties over the lower, and depravity and mental suffering in predominant and perverted propensity. These conditions of perfection and happiness on the one hand, and of sin and misery on the other, are FUNDAMENTAL. Hence, since animal food necessarily developes and perverts propensity[37], but blunts moral sentiment[42], therefore man should not sensualize his nature by eating flesh. He who does, deteriorates his heaven-bestowed endowments, and plants thorns in the pillow of enjoyment.

45. ANIMAL FOOD SHORTENS AND ENFEEBLES LIFE.

A flesh diet is confessedly a powerful, though unnatural stimulant, and, like alcohol, excites and inflames, only premamaturely to exhaust. This is its CONSTITUTIONAL effect—NECESSARY, not accidental. It therefore hurries its participants through life, and OUT of life, in true hot-house style. All the mental and physical functions of vegetable eaters proceed with little friction, and as though well oiled, so as to run smoothly and wear but little, while flesh eating renders them hot and grating, as though the axles of life ran on gravel-stones, and therefore wear out rapidly. Hence, very aged people will generally be found to have eaten but little meat through life, and to have began to eat that little after their constitutions had become fully matured. The herb-eating elephant is reputed to live nearly twice as long as the flesh-eating lion—the longest liver of all the carnivora.

Animal food also irritates the stomach and fevers the blood, and thus lashes up the brain, and goads on all the passions to excessive and turbulent action. What else causes that restless, dissatisfied, longing, high-pressure, grasping, envious, rapacious selfishness of the public mind, now everywhere so rife? Our fathers ate but little flesh, and were proportionably contented and pacific. Flesh eating induces a faint, sunken, gnawing, craving, "gone" sensation at the stomach, akin to that of inebriates, but wholly unknown to vegetable-eaters; and this stomatic irritation fevers the brain, especially the passions ——, and engenders this tendency to public rapacity and

vice just described; and this shortens the public life, on the principle maintained by all physiologists, that turbulent passions hasten death, while contentment prolongs life. Animal food, therefore, kindles those propensities[37] which shorten life, and blunts those moral virtues[42] which prolong it. All this, besides the many diseases its use engenders and aggravates, and the cure of which it retards.

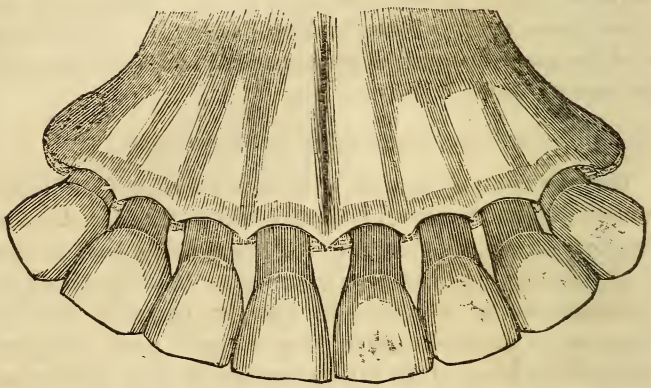
46. THE HUMAN TEETH NOT CARNIVOROUS.

That the forms of the teeth of all animals coincide with their natural dietetic character, is a universal truth. On this point President Hitchcock observes: "From a single bone or tooth of any animal, its character, food, habits, haunts, and all the circumstances of its existence may be correctly inferred. Comparative anatomists have, from a single tooth, described, and made drawings of the extinct creature to which it belonged, which have been found to agree exactly with a skeleton afterwards discovered." In short, that the teeth of every animal known and unknown, accord perfectly with its natural food, is universally admitted; so that the form of the human teeth will determine with absolute certainty, the natural dietetic character of man. If constituted to eat meat, the shape of his teeth will approximate towards that of lions and tigers—his front teeth will be small and sharp; his eye teeth, which correspond with the tusks, hooked and enormously large, and his back teeth sharp, for tearing, instead of broad, for crushing; whereas, if his natural diet is vegetable and farinaceous, his back teeth will be adapted to grinding, and his eye teeth not longer than their neighbors.

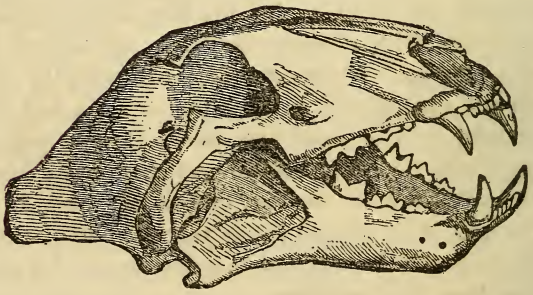
The following engraving of the cow furnishes a standard sample of herbivorous teeth, as do those of the tiger of the teeth of the carnivora.

And now, reader, see with your own eyes, towards which of these two forms the teeth of man approximate. See for yourself, that his front teeth are usually larger than his eye teeth; and his double teeth flat, for grinding, instead of sharp, for tearing. Not one index of the carnivorous form is found in his teeth. Now this principle constitutes a final umpire,

from which there is no philosophical appeal. The absence of claws has a kindred bearing.



No. 1. Upper Jaw of the Cow



No. 2. Jaws of the Tiger.

"But," objects one, "man has hands with which to kill, and reason, to supply by cookery the place of tusks." This is sheer evasion, and leaves this teeth argument wholly untouched. It simply tries to account for the admitted omission of tusks in man, but is anything but a flesh-eating argument. As far as it has the least force, it tends to overthrow this principle, that the teeth determine the natural character of the food—a

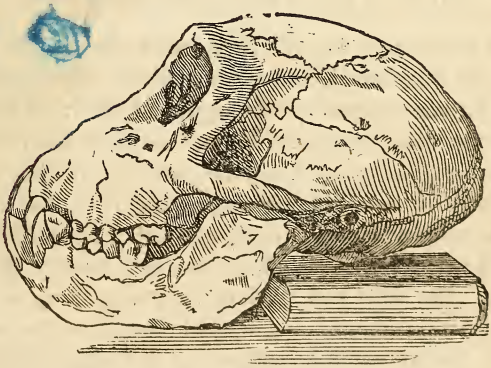
principle too fully established by nature as one of her infallible landmarks, to be set aside by this mere may-be.

To render assurance doubly sure, let us contrast the teeth of the monkey tribes, with those of man. We know that flesh is not their natural diet, else they would kill and eat animals; yet the form of their teeth approximates toward that of the carnivora much more nearly than that of man's does. This the following engravings of the monkey, baboon, and ourang-outang fully evince.

TEETH NOT CARNIVOROUS.

No. 3. Monkey.

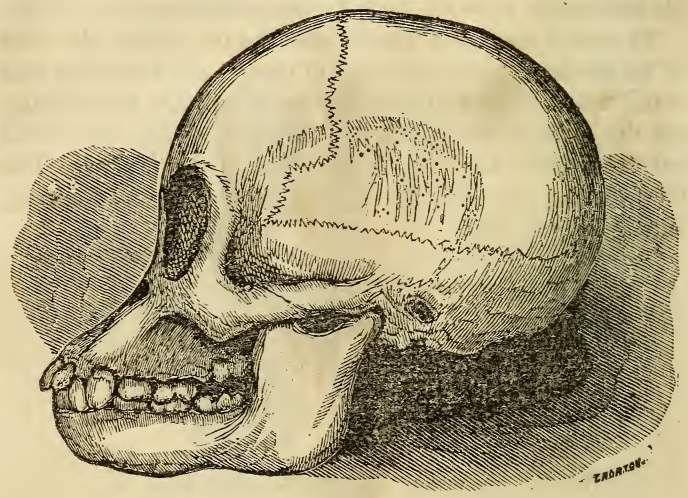
No. 4.



No. 5. A Baboon.

Since, therefore, the form of the human teeth recedes from that of the carnivora far more, even, than that of the monkey and ourang-outang species, which are confessedly not carnivorous, therefore, human teeth were not made to eat meat. What proof can more conclusively attest anything, than this establishes the natural diet of man to be herbivorous?

TEETH NOT CARNIVOROUS.



No. 6. Jaco, a male Ourang Outang.

To this conclusion nearly every sound physiologist has been impelled, by this dental, and other kindred arguments. The immortal Linnæus sums up this argument thus: "Fruits and esculent vegetables constitute his most suitable food." Cuvier, the highest authority on this point, sums it up thus: "The natural food of man, therefore, judging from his structure, appears to consist of fruits, roots, and other succulent parts of vegetables; and his hands offer him every facility for gathering them. His short and moderately strong jaws on the one hand, and his cuspidati being equal in length to the remaining teeth, and his tubercular molares on the other, would allow him neither to feed on grass nor devour flesh, were these aliments not prepared by cooking."

That distinguished physiologist, Professor Lawrence, sums up an elaborate argument on this point as follows: "The teeth of man have not the slightest resemblance to those of carnivorous animals, except that their enamel is confined to the external surface. He possesses, indeed, teeth called canine, but they do not exceed the level of the others, and

are obviously unsuited for the purposes which the corresponding teeth execute in carnivorous animals." "Whether, therefore, we consider the teeth and jaws, or the immediate instruments of digestion, the human structure closely resembles that of the semiæ or monkeys, all of which, in their natural state, are completely frugivorous."

Dr. Thomas Bell, in his "Physiological Observations on the natural food of man, deduced from the character of his teeth," declares, that "every fact connected with human organization goes to prove, that man was originally formed a frugivorous animal." Cullen and Lamb took similar ground, and the Abbe Galani ascribed all crimes to animal destruction. Pope protests against "kitchens sprinkled with blood," and insists that animal food engenders crime. Plutarch tells us that Pythagoras ate no pork, and wondered what first "led man to eat carcass."

These conclusions, however unpopular, have been extorted from every rigid physiologist who has ever examined this subject; and are confirmed by the length of the alimentary canal, which is short in the carnivora, long in the herbivora, and long in man—about ten times the length of his body.

These two arguments, derived from the structure of the teeth and alimentary canal, of themselves completely establish the dietetic character of man to be vegetable; and, taken in connection with those converging principles already adduced and yet in reserve[36 to 51], establish this anti-flesh-eating argument as a fundamental ordinance of nature.

47. A FLESH DIET WASTEFUL.

Our earth is soon to be crowded with as dense a population as its utmost powers of sustaining human life, combined with the most rigid economy of its necessaries, will support. This is undoubtedly the economy of nature — . Hence, since a given amount of land will sustain more human beings, by about ten to one, if its products are consumed directly by man, than when fed to animals, and they eaten as food, the economy of nature could never have been to submit to this THOUSAND PER CENT. loss, in order to sustain vegetable-eaters;

unless one flesh-eater enjoys as much as ten vegetable-eaters[1]. If the economy of nature really requires and therefore favors a flesh diet, it would have arranged things so as to have supported a far greater number of flesh-eaters than vegetable-eaters; whereas, since it can sustain ten times as many exclusively vegetable-eaters as exclusively flesh-eaters, therefore a flesh diet is in opposition to nature's general plan of economy.

To examine this matter in the light of facts. A given amount of territory will sustain probably a thousand Anglo-Americans by agriculture, to one Indian by the chase. Suppose the earth already fully stocked with human beings—shall this one Indian be allowed to engross what would support a thousand human beings better than he is sustained? If the Indian would be content with this thousandth part of his territory, let him remain; but he has no right to interrupt the existence of nine hundred and ninety-nine human beings, still better capacitated to enjoy life than himself. Hence nature has so ordered it, that the Indian shall recede before the march of civilization, unless he incorporates himself with it; because a vegetable diet can sustain so many more happy beings than the savage state. And his punishment is just.

Carnivorous animals furnish another phase of our argument. To support one lion requires thousands of acres. Hence, since nature abhors prodigality as much as vacuums, she ordains that the lion and all beasts of prey shall retire at the approach of man; that is, yield their dominion to him as fast as he requires it, because he puts it to so much better use than they. The principle here stated is a law of things. Shall, then, one flesh-eater be allowed to keep ten vegetable-eaters from enjoying all the luxuries of life? Or in this proportion as far as animal food is eaten? Human happiness is nature's paramount object[1]. To this, numbers are indispensable. Since, therefore, ten vegetable-eaters can enjoy more than one flesh-eater, they should take the precedence; and flesh-eating must decrease as population increases. In fact, one of the former enjoys much more than one of the latter[37] [38] [39] [40] [42] [44]. This waste of the necessaries of life by flesh-eat-

ing, and this deterioration of human enjoyment, therefore, clash fundamentally with human numbers and happiness, which condemns a flesh diet as contrary to the nature of man.

It may here be argued, that domestic animals, as swine, hens, and the like, are usually kept on offal food, which man does not eat, and that the offals of the farmyard and sty enrich the land, and thus increase its productiveness more than animals decrease its products. This argument has some force as regards a very few domestic animals, but these few would not furnish a tithe of the meat now consumed, the main bulk of which is fattened on land or vegetables set apart EXPRESSLY for that purpose. The manure made by animals can doubtless be made quite as well by piling up straw, weeds, and refuse vegetation, and letting nature fit it for enriching soil—and even by spreading them directly upon the ground, which is nature's method. Manure can also be manufactured by a chemical process, without assistance from animals. Yet perhaps a few horses, cows, and hens, should be kept, and can be turned to excellent account.

If it be farther objected that nature provides for the growth of grass, especially in untillable marshes, so that cattle can be kept without transgressing on the sustenance of man, the reply is, that a limited supply of cows may possibly be beneficial; yet butter may be made from the grass or hay direct, just as good as from the cow, and four or five hundred per cent. more in quantity from the same amount of provender; which completely refutes the objection. Another far more plausible argument for flesh, is that drawn from the necessity of carbon; which, however, we shall wave till we come to treat of animal heat. It is now submitted, whether man's physical or moral perfection requires a flesh diet; whether, in fact, he is not far better—more elevated, and happy without, than with it. If his nature had been adapted to it, the evidences of the consequent requisition would have been clear and palpable; whereas, we find no one law of his being which requires it, but many by which it is interdicted. Facts, principles, everything, bear against its use, and nothing in its

favor. The cravings of perverted appetite aside, say, intellectual reader, does the constitution of man require that he eat flesh? If not, then we all eat it at our peril. We violate law, and must surely suffer its righteous penalties[7].

One counter consideration, however, drawn from man's tendency to progression, yet remains. The opening remarks of volume two develope this progressive tendency, from propensity towards moral sentiment. In the earlier stages of humanity, propensity is indispensable to clear and subdue the earth; nor is the argument of economy[47] particularly forcible till the earth has become crowded throughout. Man may not yet be sufficiently advanced to render it imperiously necessary for him to abstain wholly from meat, but as such abstinance fulfils his nature, his progress would be greatly accelerated thereby.

48. FRUIT AND GRAIN MORE PALATABLE THAN MEAT.

Since, then, man should not eat meat, on what shall he subsist? On FRUITS AND FARINACEOUS FOOD, MAINLY, interspersed with vegetables, nuts, eggs, and perhaps the products of the dairy. The unbolted flour of wheat, rye, oats, barley, corn, buckwheat, etc., made into bread and puddings in various forms, and seasoned with fruits and sweets, should constitute the main bulk of his diet; and to it should be added potatoes, beans, peas, beets, carrots, turnips, parsnips, nuts, eggs, and perhaps a limited supply of milk, cream, butter, and cheese, though the utility of the last will soon come up for discussion. The warrant for this dietetic system is, first, its far greater PALATABLENESS than flesh[33]. That it is relished better, is evident. We always reserve the best part of our meals for the dessert—though we ought to eat the best first—and that dessert consists of fruit, pies, puddings, and cakes, or of oranges, nuts, and raisins, or apples, peaches, pineapples, or berries, and the like, but rarely of meat—never except in minced pies, from five-sixths to nine-tenths of which are composed of flour, apples, sugar, cider, and spices; so that flesh is almost excluded from our list of desserts, because less palatable than flour and fruit. We paraphrase good

living by "roast beef and plumb pudding." Why place the plumb pudding last? Because it is best, and therefore brought on AFTER the roast beef; yet it is composed of flour and fruit, sweetened. Similar remarks apply to all other kinds of puddings. In extra good dinners, almonds and raisins are brought on last, because best of all. How much better these fruit and flour desserts relish than meats and gravies, even after the appetite is glutted with the latter? But eat as much of the dessert first as now of meat, and then bring on your beef and pork, and they would scarcely be touched. We all know how much keener the appetite is at the beginning of meals than at the close, and yet a sated appetite likes the flour and fruit preparations much better than the meat dishes. Hence, as that tastes best which is best[33], fruit and flour constitute the natural diet of man.

Vary the experiment. Set berries and milk, and also meat, before any children you please, and after telling them to make their meal wholly of the one they like best, yet partake of but one dish, and they will all prefer the milk and berries. And this is true of most adults. Many readers can testify that suppers composed of milk, bread, and berries, relish better than any other meal. In the absence of berries, apples, peaches, pears, and other kinds of fruit, cooked and raw, in their place relish about as well. Peel, cut, and sweeten peaches, and tell children they can eat them with bread and butter, or that they can have meat and butter with bread, but if they choose the meat must not have the peaches, and not one in hundreds will prefer the meat. Nor one in millions prefer all meat to all vegetables and fruit. So of dried peaches or apples, stewed with raisins, and sweetened. Many kinds of pears are still better. Give adults the same choice, and in spite of their perversion of appetite consequent on eating so much meat, most prefer the bread and fruit. Or set apple dumplings and good sauce upon the table with meat, it being understood that boarders can have their choice, but must partake of only one dish, and most will relish the fruit and flour preparations better than the meat. Or make a stew pie of flour and apples, or cherries, or berries, or peaches,

green or dried, or pears, or raisins, or any other kind of fruit, well sweetened, and most people prefer it to all other edibles. And all would eat a much greater proportion of these various preparations of fruit and flour than they now do, only that they are considered too CHOICE and SCARCE to constitute a full meal—and thus of nuts and raisins. But for the impression that these desserts are not substantial enough for laboring men—an idea entirely erroneous[38 39 40]—and that they are the most expensive—also erroneous—that is, if appetite had its choice, it would eschew meat, and prefer sweetened preparations of bread and fruit almost altogether.

The same result is obtained by another variation of the experiment. Contrast the relish with which most people eat short-cake and butter, or buckwheat cakes and molasses or honey, with meat and gravy. Not that these cakes are recommended, yet they still further illustrate our doctrine, that preparations of flour and fruit RELISH better, especially with children, than meat.

The various kinds of cake eaten, still further prove our doctrine. We calculate on supper as the most dainty meal of the three, and cake is to it what desserts are to dinner, namely, the very climax of all. This is doubly true of the WEDDING cake. Weddings are among the most important events of life, and nuptial suppers are important items of weddings; and hence no expense or pains are spared to render them the very achme of luxurious eating. And in what does this achme consist? In roast beef? In any preparation of flesh? No; but in wedding CAKES. If meat were generally esteemed to TASTE the best, the married pair would send out cuts of meat, instead of cake, which is never done. These tests of what the public relish best are infallible, though so common as to have escaped general observation. What supper can relish better than bread, butter, and honey, except it be short-cake or buckwheat cakes in place of bread? How insignificant meat in comparison!

Finally, after we have eaten our buckwheat and molasses breakfast, our fruit and flour or meat dinner and dessert, and our short-cake-and-butter supper, "topped off" with preserves

and cake, we stroll out in the evening with some loved one, and wishing to heighten our friendship by partaking together the very daintiest morsel known to the palate, we step into a confectionary—the sole object of which being to gratify the palate, it of course proffers the most dainty of luxuries—and call for what? Meat in any form? No, but ICE CREAMS, etc.; if in their season, STRAWBERRIES AND CREAM, or other berries in their respective seasons, because they furnish the highest gustatory enjoyment known to man—not to a few, for then they would not be kept, but to ALL, because preparations of meat are rarely kept by confectionaries proper, and when kept, are designed for FOOD, not as a relish merely. Who loves roast beef better than rich Vergaluce pears, golden apricots, Morris White peaches, and other delicious fruits? If meat tasted best to the many, it would be the "crack-up dish;" but ice-creams, berries-and-cream, jellies, preserves, cakes, custards, macaronis, floating-islands, blanck-mange, candies in various forms, oranges, lemonade, and the like—all preparations of flour, sugar, eggs, nuts, and fruit—make up what all regard as the real DAINTIES of the palate, to the entire exclusion of flesh preparations.

Our proof is thus conclusive, that farinaceous preparations are more palatable than flesh; yet, as many will believe nothing not found in the Bible, and most regard it as paramount authority, it also sustains our doctrine: "Butter and honey shall he eat," because these were the daintiest luxuries that could be named, and his prophetic feeding on such dainties indicated his super-royal rank. "What is sweeter than honey?" says Samson. Many kindred allusions show that farinaceous food was esteemed far more delicious than meat in Scripture times, and that grapes held a similar rank. Honey is frequently mentioned in Scripture as the most delicious species of edibles, and this the tastes of the moderns also attest.

A chapter in the Author's dietetic experience. Not that he sets up his own taste as a standard for others, but that others may be induced to make like experiments. With the first appearance of strawberries annually, he picks or buys, mashes,

sweetens, and adds water or milk, and breaks in brown bread. This dish constitutes his only diet for breakfast and supper, and often for dinner, when he eats three diurnal meals. When strawberries disappear, raspberries—he prefers the black, which he cultivates—supply their place, till they give way to currants, whortleberries and blackberries. Give me this diet, and you are quite welcome to all the flesh-pots of modern cookery. I envy not a prince his dainties, but fancy that my living is far more delicious than his.

These gone, pears and peaches take their place. I sit down to breakfasts and suppers consisting of peaches or pears, sometimes cut, mashed, watered and sweetened, with bread, but oftener to bread and peaches or pears alone. Let the bread and fruit be first-rate, and I have no desire to taste meat, be it of the choicest varieties. I often vary the dish by adding cream or milk in small quantities, just sufficient to moisten the whole. This diet serves me till November, and always I regret its departure, but intend to prolong it by raising WINTER pears. I sometimes vary the dish by stewing or boiling the pears in water, and add molasses, eaten with bread. Baked apples and bread, sometimes eaten alone and sometimes cut into milk, furnish another change; and still another consists in a pudding made of potatoe starch, milk, and eggs, eaten with cream and sugar, jelly or fruit. Stewed cherries furnish another variety, and so do dried fruits stewed, to which add raisins, and you make a delicious relish. Prunes stewed in considerable water, with bread, constitute another variation. And if flesh eaters relish their steaks, sirloins, chops, fowls, hams, or even pigeons, woodcock, canvass-back ducks, salmon, or their turtle-soup, etc., better than I do these dishes, I am nevertheless quite contented with my own fare. Understand that I LIVE on these delicious dishes, instead of eating them as relishes merely; thus making entire meals of nothing but desserts; eaten not after the appetite has been sated as well as blunted[49] with meats, but with all the keenness of fresh appetite.

Thus much for breakfast and supper. For dinner—which, however, in consequence of often postponing my breakfast till

nine or ten o'clock, I frequently omit—I take often the same as for breakfast and supper; or sometimes eat peas, beans, eggs broken into water and boiled but little, or butter-milk or sour milk sweetened, or the apple or cherry of pot-pies and dumplings eaten with bread, or mealy potatoes, or rice with molasses, milk, or fruit, or custard and bread, or bread and apples, etc., etc. Greens, squashes, melons, onions, beets, turnips, pumpkins, especially pumpkin pies, I relish without meat; but eschew cucumbers, raddishes, green corn, and all fresh-cooked flour victuals, such as short-cakes, the crust of dumplings and pot-pies, etc. I once loved cucumbers and green corn, but found they injured me, and discontinued them years ago, and have now lost all relish for them. Similar abstinence will conquer any and all vitiated cravings. Raddishes may do well enough when boiled, and cucumbers and corn when ripe, or fried, yet others are quite welcome to the PAINS consequent on eating them while crude and uncooked.

My winter and spring diet consists mainly of bread and apples, the latter generally uncooked, but sometimes stewed or baked. Sweet apples are preferable, because they contain much more substance than sour. Corn cracked and hulled, commonly called homminy, is another favorite dish, and so are Indian and oat-meal gruels, and also oat-meal, Indian, rye and wheat mush, the flour for the last two unbolted. I eat honey freely in winter. Nor are split-peas or white beans made into soup for dinner one day, and the balance baked the next, such poor fare as to be allowed to fall into disuse. But of these hereafter. Give me my farinaceous diet for GUSTATORY pleasure merely, as well as health, and you may have the meat. Nor would I give my diet in exchange for that of kings and queens—reference being had to its deliciousness merely.

If objection be raised to this diet on the score of expense, it is claimed that it is certainly CHEAPER than flesh. All kinds of grain are cheap compared with meat, and any one can raise fruit enough for family consumption, on a small piece of ground, or buy it with far less money than the same amount of nourishment costs in the form of meat. Apples and flour

are the cheapest kinds of food eaten, and would be much cheaper if less grain were fed to cattle, and pastures converted into orchards. But expense is nothing where health is concerned [22]. That diet is cheapest in the end, be its first cost what it may, which best sustains mind and body. But this matter of expense is foreign to our present inquiry, which appertains to the PALATABLENESS of food.

Having shown that that diet IS best which TASTES best, and that preparations of bread, sweets, and fruits are more delicious than meats; therefore they are best for man, and his natural diet.

49. ANIMAL FOOD BLUNTS TASTE.

Our gustatory argument in favor of a farinaceous diet derives additional force from the fact, that meat blunts the taste, especially if highly peppered and spiced. Of this Caspar Hauser furnished a striking example; and all will confirm it who will try the two, say a year each, or long enough for the taste to become regulated. My own experience accords with this principle; and I submit to all who have changed their diet from a mixed to one exclusively vegetable, whether the mere pleasure of eating has not been doubled in consequence. My full conviction is that mankind, by following the farinaceous system, eating temperately, and adopting the right mode of cookery, might double their gustatory pleasures several times over. Appetite thus palsied can have little relish for anything. Hence, since a flesh diet blunts that keen natural relish on which all table enjoyments depend, besides being less palatable [48], why curtail those enjoyments by eating meat? Still, all who choose meat, have a perfect right to their choice. Mark how all collateral aspects of our subject favor a farinaceous diet, but bear against flesh.

50. A BREAD AND FRUIT DIET NOURISHES MORAL SENTIMENT.

We have seen that some kinds of food develope some mental and physical elements, and other kinds other elements [32]; and also that animal food kindles propensity [37]. And since propensity has its natural diet, of course moral sentiment has its,

and intellect its, on that "whole-or-nothing" principle already presented[17]. Then what kinds of diet are especially adapted to promote moral sentiment and intellect? A FRUIT AND FARINACEOUS. Our proof is the converse of that already presented touching animal food; namely, that all farinaceous animals are docile and kindly disposed, as the sheep, cow, horse, and the like. Those human masses who live on vegetables, as the Hindoo, Chinese, and Japanese, not only have less Destructiveness[38], but manifest more religious zeal than flesh-eating communities. To say that they have a thousand per cent. more religious feeling than we have, is quite within bounds. True, it is poor in kind, but we speak of QUANTITY. It only requires guiding, there is abundance of it. Behold their sacrifices and self-tortures, to please their idols! Their religion is their all. They are moreover honest. Their silks, teas, etc., are as recommended. Not so with flesh eaters. We have a mongrel religion, which we twist into all sorts of phantasies as propensity may dictate. Our religion bends to our other faculties; their other faculties bend to their religion. Ours is on the surface—a Sunday coat which we seldom wear—theirs is their under garment. Much of ours is shallow pretension, based in policy and sheer selfishness; theirs their heart's core. Nor can a flesh-eating nation be named, who are not more animal than moral, or pious. The Indian is still less religious than we are, and eats more flesh. And this general fact holds good everywhere, and in all ages.

Similar results are derived from the organs called into action in PROCURING farinaceous food. While animal food cannot be procured without a violent exercise of propensity in its worst forms[37], nor without also violating the moral sentiments[42], to procure farinaceous food requires the exercise of intellect and moral sentiments. Thus, Agriculture is a true science, and requires a great amount of knowledge and intellect for its successful prosecution, and is calculated to develope that intellect. The very nature of things, therefore, requires that fruits and grains should feed those faculties required in procuring them, just as to procure animal food requires propensity with little morality, which accordingly feeds propen-

sity [37], but blunts moral sentiment [42]. Unless this is thus, nature is not true to herself; for one of her ordinances is that all food shall feed those faculties in particular, which are most called into action in its pursuit [36].

Again, predominant propensity cannot consist with predominant moral sentiments, and therefore the latter is incompatible with a mixed diet. With what, then, does it consist, if not with a farinaceous diet?

In conclusion, readers, which one of all our arguments is not amply sufficient, in and of itself, to prove that the natural dietetic character of man is farinaceous, and not carnivorous? Scrutinize each separately, and then scan them all collectively with rigid intellectual optics, and then say whether, taken collectively, they do not completely interdict meat, and prove a grain, esculent, and fruit diet to be the ONLY one provided and allowed by nature, and of course the one most promotive of human and personal happiness and perfection. Is not our argument both irrefutable and a satisfactory exponent of man's natural dietetic character? Do not those who eat meat violate their natures, and therefore eat it at their peril? Do not those who live on fruits and vegetables fulfil nature's dietetic ordinance, and thus reap her reward? Are they not only both safe, but infinite gainers by eschewing meat and living luxuriously on the bounties and fruits of the earth? "He that is wise, is wise for himself, but he that scorneth, he alone must bear it."

51. VEGETABLES FURNISH ALL THE NUTRITIOUS ELEMENTS REQUIRED IN THE VITAL PROCESS.

The only shadow of doubt now remaining as to the fitness of an exclusively farinaceous diet for human sustenance, depends on the answer to this question: Do vegetables contain all the elements which enter into, and are required by, the vital process? If so, our argument is complete. And who can answer this question equally with the great Liebig? His "Animal Chemistry," one of the most profoundly philosophical works on this new subject of scientific inquiry, (if on any other,) ever written, thus answers this question:

"Two substances require especial consideration as the chief ingredients of the blood; one of these separates immediately from the blood when withdrawn from the circulation. It is well known that in this case blood coagulates, and separates into a yellowish liquid, the SERUM of the blood, and a gelatinous mass, which adheres to a rod or stick in soft, elastic fibres, when coagulating blood is briskly stirred. This is the FIBRINE of the blood, which is identical in all its properties with muscular fibre, when the latter is purified from all foreign matters.

"The second principal ingredient of the blood is contained in the serum, and gives to this liquid all the properties of the white of eggs, with which it is identical. When heated, it coagulates into a white elastic mass, and the coagulating substance is called ALBUMEN.

"Fibrine and albumen, the chief ingredients of blood, contain, in all, seven chemical elements, among which nitrogen, phosphorus, and sulphur are found. They contain also the earth of bones. The serum retains in solution sea salt and other salts of potash and soda, in which the acids are carbonic, phosphoric, and sulphuric acids. The globules of the blood contain fibrine and albumen, along with a red coloring matter, in which iron is a constant element. Beside these, the blood contains certain fatty bodies in small quantity, which differ from ordinary fats in several of their properties.

"Chemical analysis has led to the remarkable result, that fibrine and albumen contain the same organic elements united in the same proportion, so that two analyses, the one of fibrine and the other of albumen, do not differ more than two analyses of fibrine or two of albumen respectively do, in the composition of 100 parts.

"Both albumen and fibrine, in the process of nutrition, are capable of being converted into muscular fibre. and muscular fibre is capable of being reconverted into blood. These facts have long been established by physiologists, and chemistry has merely proved that these metamorphoses can be accomplished under the influence of a certain force, without the aid of a third substance, or of its elements, and without the addition of any foreign element, or the separation of any element previously present in these substances.

"The nutritive process in the carnivora is seen in its simplest form. This class of animals lives on the blood and flesh of the graminivora; but this blood and flesh is, in all its properties, identical with their own. Neither chemical nor physiological differences can be discovered.

"In a chemical sense, therefore, it may be said that a carnivorons animal, in supporting the vital process, consumes itself. That which serves for its nutrition is identical with those parts of its organization which are to be renewed.

"Chemical researches have shown, that all such parts of vegetables as can afford nutriment to animals contain certain constituents which are rich in nitrogen; and the most ordinary experience proves that animals require for their support and nutrition less of these parts of plants in proportion as they abound in the nitrogenized constituents. Animals cannot be fed on matters destitute of these nitrogenized constituents.

"These important products of vegetation are especially abundant in the seeds of the different kinds of grain, and of peas, beans, and lentils; in the roots and the juices of what are commonly called vegetables. They exist, however, in all plants, without exception, and in every part of plants in larger or smaller quantity.

"When the newly expressed juices of vegetables are allowed to stand, a separation takes place in a few minutes. A gelatinous precipitate,

commonly of a green tinge, is deposited, and this, when acted on by liquids which remove the coloring matter, leaves a grayish white substance, well known to druggists as the deposit from vegetable juices. This is one of the nitrogenized compounds which serves for the nutrition of animals, and has been named VEGETABLE FIBRINE. The juice of grapes is especially rich in this constituent, but it is most abundant in the seeds of wheat, and of the cerealia. It may be obtained from wheat flour by a mechanical operation, and in a state of tolerable purity; it is then called GLUTEN, but the glutinous property belongs, not to vegetable fibrine, but to a foreign substance, present in small quantity, which is not found in the other cerealia.

"The second nitrogenized compound remains dissolved in the juice after the separation of the fibrine. It does not separate from the juice at the ordinary temperature, but is instantly coagulated when the liquid containing it is heated to the boiling point.

"When the clarified juice of nutritious vegetables, such as cauliflower, asparagus, mangel wurzel, or turnips, is made to boil, a coagulum is formed, which it is absolutely impossible to distinguish from the substance which separates as coagulum, whem the serum of blood or the white of an egg, diluted with water, are heated to the boiling point. This is VEGETABLE ALBUMEN. It is found in the greatest abundance in certain seeds, in nuts, almonds, and others, in which the starch of the gramineæ is replaced by oil.

"The third nitrogenized constituent of the vegetable food of animals is VEGETABLE CASEINE. It is chiefly found in the seeds of peas, beans, lentils, and similar leguminous seeds. Like vegetable albumen, it is soluble in water, but differs from it in this, that its solution is not coagulated by heat. When the solution is heated or evaporated, a skin forms on its surface, and the addition of an acid causes a coagulum, just as in animal milk.

"These three nitrogenized compounds, vegetable fibrine, albumen, and caseine, are the true nitrogenized constituents of the food of graminivorous animals; all other nitrogenized compounds, occuring in plants, are either rejected by animals, as in the case of the characterestic principle of poisonous and medicinal plants, or else they occur in the food in such very small proportion, that they cannot possibly contribute to the increase of mass in the animal body."

"How beautifully and admirably simple, with the aid of these discoveries, appears the process of nutrition in animals, the formation of their organs, in which vitality chiefly resides! Those vegetable principles, which in animals are used to form blood, contain the chief constituents of blood, fibrine and albumen, ready formed, as far as regards their composition. All plants, besides, contain a certain quantity of iron, which re-appears in the coloring matter of the blood. Vegetable fibrine and animal fibrine, vegetable albumen and animal albumen, hardly differ even in form; if these principles be wanting in the food, the nutrition of the animal is arrested; and when they are present, the graminivorous animal obtains in its food the very same principles on the presence of which the nutrition of the carnivora entirely depends.

"Vegetables produce in their organism the blood of all animals, for the carnivora, in consuming the blood and flesh of the graminivora, consume, strictly speaking, only the vegetable principles which have served for the nutrition of the latter. Vegetable fibrine and albumen take the same form in the stomach of the graminivorous animal as animal fibrine and albumen do in that of the carnivorous animal."—LIEBIG'S *Animal Chemistry*.

Liebig's concluding paragraph answers our question affirmatively, and in the most conclusive manner, by showing that even the carnivora are nourished solely by those chemical elements derived from the vegetable food of their prey! So that even the carnivora live, after all, on vegetable aliments. Rigid scientific analysis, therefore, sustains our position, that animal food is unnecessary to human sustenance. And the fact, that many have lived half a century or more without tasting of animal food, and enjoyed all their powers and faculties [41], bears a kindred testimony; for if animal food furnished a NECESSARY element of diet which could be obtained nowhere else, all those who wholly abstained from it would soon feel its want, become enfeebled, pine away, and die; whereas many of them become every way improved in mind and body by such abstinence; and this shows, that the human system CAN obtain from vegetables all it requires to perfect all its functions.

SECTION II.

BREAD, PASTRY, FRUIT, MILK, SWEETS, BUTTER, AND ESCULENTS.

52. BREAD, AND ITS PREPARATION.

HAVING thus found nature's great dietetic landmarks in a farinaceous diet, we proceed to fill up this outline by examining more in detail the nutritive properties of the different edibles found in the vegetable kingdom [3]. Of these, bread is beyond question the most important—is the veritable "STAFF OF LIFE"—and therefore deserves primary consideration; and the more so, since the materials of which it is made are used in composition with almost all other kinds of food.

Bread is made chiefly of GRAIN, of one kind or another, crushed or ground into flour, which is usually bolted. Thus far, these grains have constituted the great staple of human diet. From time immemorial, and in all nations, except the most degraded savages, they have been the chief reliance of the human family as food, and will undoubtedly still continue

to be while the race exists. Other forms of food may be generally introduced, as potatoes have lately been, yet never to take the place of "flour victuals," but only to accompany them. With many kinds of food we do not eat meat, but we eat bread with all kinds, and more bread usually than anything else. We make flour, both fine and coarse, bolted and unbolted, into various forms of food, both with shortening and without, with and without sweetening, with various kinds, single and mixed, as all wheat, all rye, all Indian, all barley, all oatmeal, all rice, and part wheat and part Indian, or "rye-and-Indian," or "wheat-and-rye." We also boil each of these kinds of flour into puddings, the main ingredients and dietetic uses of which are the same as bread, or sweeten, shorten, and fry in fat, making crullers, doughnuts and nut-cakes; or shorten and add fruit, as in the manufacture of apple-fritters, and also of pies of all kinds, pot and meat-pies included; or thickened into soups of all kinds, or made into "dressings;" and thus we work them into nearly all the food we eat. Even meat eaters live mainly upon them, and so do many species of animals. Undoubtedly, after ages will discover and perfect many other kinds of grain now growing wild in our swamps, or mountains, or forests, as a recent one has Indian corn. But cereal grains will always be a staple article of food.

These grains are simply seeds, and all seeds contain nourishment, in order to feed the sprout till it can put forth its roots and draw sustenance from the earth. And it is this nutritious principle, stored up for the purpose of nourishing the plant in its embryo, which sustains human and animal life. And the probable reason why the flour of grain forms the best species of nourishment for man is, that it is so highly organized, and so condensed. It can also be ground fine, and by proper management, preserved for years.

Chemically analyzed, wheat, the best of the entire cereal family, contains about eight-tenths of nutritious substances; rye, barley, and oats, about the same; rice nine-tenths, and Indian corn about seven-tenths; while meat contains only about five and a half tenths.

Bread being thus promotive of life, its preparation, so that

it shall nourish us in the best possible manner, becomes a matter of the utmost importance.

After the grain is duly cleansed—and none of us know how much besides wheat is ground up with it—it is first ground. And here two egregious errors are committed. The weight of the stone and its rapidity of motion, both crush it so fine and heat it so hot, as essentially to impair its nutritive properties. Hence, flour is often said to be "dead;" much of its "life," or nutrition having been destroyed. Indian meal suffers much from being similarly "killed," as is evinced by its far greater sweetness when coarse ground, than when ground extra fine—warrant enough that excessive grinding impairs the nutritive properties[33].

53. COARSE AND FINE FLOUR BREAD.

Grain is ground thus fine that it may be bolted the more closely, so as to become the whiter. But shall looks be allowed to impair quality? The bran, or at least a good portion of it, left in, greatly improves its nutritive capability. Else nature would have allowed us to separate it from the flour without grinding the latter to death. Its presence also greatly promotes that intestinal action so essential to digestion. Its absence facilitates that torpor of the digestive organs and consequent constipation, which paves the way for those stomatic complaints to be discussed hereafter. Give fine flour to hens, cattle, horses, or any other animals, and it will soon disorder them effectually, and breed disease. And unless man were stronger constitutioned than any other animal, it would break down and bury all who eat it. Indeed, it is now effectually consuming its consumers by hundreds of thousands; not suddenly, but gradually, by impairing digestion and thus inducing other diseases to which the death is ascribed. All who eat coarse and unbolted flour bread, will thereby obviate half their sickness. It keeps the intestinal canal open, and this carries off those causes of disease which fine flour bread, by inducing constipation, retains in the system to engender sickness. Nothing but dire necessity ever induces me to live habitually on fine flour bread. It immediately occasions intestinal sluggishness

and stomatic disorder, and, in consequence, greatly enhances dyspeptic troubles. I even pen this paragraph after having just recovered from the worst dyspeptic attack I have experienced for years, brought on by eating fine flour bread and a very little meat, between which, for me, there is little if any choice. But give me my coarse brown bread and good fruit, with opportunities for exercise, and such troubles, as in this instance, soon disappear.

Brown bread also tastes better than superfine, as all who will make trial can perceive—another conclusive proof of its superiority[33]. Our New England ancestry ate coarse bread made of rye and Indian, and lived longer, besides enjoying far better health, than their fine-flour-fed descendants have the least prospect of living; and the Scotch oat-cake and porrage eaters rarely know how dyspepsia feels till they exchange them for "killed" flour bread. Dyspeptics also find coarse bread indispensable; and what is thus indispensable to weak stomachs would of course go far towards keeping strong ones from breaking. Even sailors cannot live on fine flour bread; much more our sedentary classes.

Besides, the nutriment of fine flour bread is too highly condensed. Sugar is highly nutritious, yet, eaten alone, it soon disorders digestion, because there is too much of it in too small a compass. A due amount of bulk is as essential to perfect digestion as the nutrition itself. The bran thus helps to "fill up," and besides restraining over-eating, gently irritates the intestinal coating, and provokes action. Still, you fine flour lovers are quite welcome to your insipid and half "killed" white bread; yet no earthly motive but absolute starvation would induce me to partake with you more than a few meals at a time.

54. LEAVENED AND UNLEAVENED BREAD.

To raise the bread is the next process in its preparation. This consists in causing fermentation, by which a gas is generated which insinuates itself among the doughy mass, and thus raises it, or renders it porous.

This portion of the bread-making process is also greatly

overdone. Fermentation is the first stage of decay. It creates the gas by souring the dough; nor is it possible to raise it without proportionally souring it, because, from the souring alone is this raising gas derived, though habit prevents our perceiving it. But let it stand a little too long, and it tastes very sour. Unleavened bread will also keep twice or thrice as long as that which is raised. Of this, ship bread, Boston crackers, and Graham wafers, are examples. This leavening is incipient decomposition, and from the gas evolved during the baking, alcohol in large quantities can be manufactured; and alcohol is the child of docomposition, or rottenness. How is yeast obtained? By excessive fermentation; and the world over, the fermenting process is the rotting process. This incipient decomposition is introduced by the yeast into the dough, and of course impairs its virtue. Hence, excessive fermentation is highly injurious.

And herein consists my unqualified opposition to "bakers' bread." It is fermented almost to death in order to make the greatest possible loaf out of the least flour. People love to be gulled. If two loaves, both containing the same quantity and quality of flour, but the one puffed up by excessive fermentation, while the other was not thus injured, though abundantly light for utility, were proffered for selection, nearly all would prefer the hollow bulk, though they knew it to be inferior to the smaller, though better loaf. This tempts bakers to contrive all sorts of devices to swell their loaves; and, to neutralize the souring, they put in ammonia and other things which leave the bread vitiated by deleterious compounds. I would eat bakers' bread rather than actually starve, yet sparingly, and only one or two meals in succession. Nothing but dire necessity could induce me to live habitually upon it. Yet others have the same right to eat it which I take in eschewing it.

Bread raised by sour milk and saleratus is less, if at all objectionable, because the gas which raises it is created, not by decomposition, but by the chemical combination of the acid of the sour milk with the alkalie of the saleratus, and raised too quickly to allow the dough to sour. I recommend

its frequent, if not general substitution for bread raised with turnpike, yeast, and the like. "Milk emptyings" bread, besides being whiter and sweeter than that made with other emptyings, is more wholesome. It becomes light before it sours, and is universally used throughout the West.

Let bread be made, then, of coarser flour, unbolted, or bolted but little; be raised with saleratus or milk emptyings, and not unduly bloated up; be thoroughly baked—and its crust is its best portion—and never eaten warm; for then mastication rolls it up into firm masses which the gastric juice penetrates with difficulty, and be eaten more abundantly than any other article of diet.

55. RICE, RYE, OATMEAL, BARLEY, ETC.

The Eastern nations live almost wholly on rice, and the Scotch on oatmeal. The former contains a greater proportion of nourishment than any other article of diet, and the virtue of the latter is attested by the powerful frames and strong constitutions of the Highland Picts. Fortunately, oatmeal is coming into general use amongst us, and I hail and would promote its introduction. As a diet for children, when eaten with milk, it probably has no superior, if equal.

The dietetic virtue of rye is not generally appreciated. Unbolted rye flour, made into hasty-pudding, is one of the most easily digested things which dyspeptics can eat. It is also exceedingly palatable. Rye bread is nutritious, opening, and, but for its color, would undoubtedly rival wheat. Try it as a change.

Barley bread was once a staple article of diet. May it again become a general favorite. The distillery should no longer be allowed to consume so wholesome, palatable, and excellent an article of food.

56. PASTRY, EGGS, AND SPICES,

Next come up for canvass. Cakes and pies are rarely eaten as food, but usually as a relish merely. They are generally deemed unwholesome, and justly so, because composed of flour and grease or shortening sweetened—a compound

exceedingly difficult of digestion. Flour sweetened is not so bad; but when shortened as well as sweetened, the stomach dissolves it with extreme difficulty. Melted butter is extremely hard of digestion, and hence the unsuitableness of cake for children. Spices still further aggravate the evil.

Bakers' cake is still more injurious. Great quantities of ammonia—a poison of which hartshorn is made—are put in to render it light; and to all this is added colored coatings, composed of poisonous ingredients. Domestic cake is bad enough, but bakers' is utterly unfit even for the adult stomach, much more for the juvenile.

If any doubt remain of the unwholesomeness even of domestic cake, the following recipes must effectually obviate it:

Pound Cake.—"A pound each of butter, sugar, and flour, and ten eggs." As ten eggs weigh a pound, of course half the cake is butter and eggs, and only one-quarter flour, and that completely saturated with sweet, grease, and eggs, baked an hour. Now we know that eggs cook abundantly in five minutes, and become extremely tough and hard in ten; and since hard-cooked eggs are universally conceded to be difficult of digestion, what must they be after being baked an hour, and in fat and flour?

Sponge cake consists of only one-fifth flour, two-fifths eggs, baked to a crisp, and the balance sugar. Shrewsbury cake contains one-third flour, above one-third butter and eggs, and the balance brandy, sugar, and nutmeg—a most deleterious compound. Jumbles are composed of about one-third flour, one-quarter sugar, and above one-third of eggs, milk, and butter. Soft cakes contain nearly half melted butter. Butter and eggs make up above half of a cake called wonders; and wondrous unhealthy it must be. Above half of even plain gingerbread consists of cream, butter, molasses, and ginger. Of composition cake, only one-fourth is flour, and nearly three-fourths eggs, butter, cream, and brandy; a full quarter being melted cream and butter. In view of the four facts, first, that melted butter, and of course fat and cream are among the most indigestible things eaten; secondly, that about half of most of our cakes are composed of these articles; thirdly, that

about one-quarter consists of eggs baked nearly or quite an hour; and fourthly, that grease mixed with flour is digested with extreme difficulty, it is submitted whether cakes are not, of necessity, most unwholesome. Add to all this, that nearly a fifth of the frosting of bakers' cake is composed of oxides of lead, to impart color; who that eats cake but must impair the stomach, engender disease, and hasten death? Our ancestors ate little cake, yet their descendants think they cannot live without it; and a mistaken kindness feeds it to children as freely as if it were the staff of life, and aggravates the evil by feeding it BETWEEN MEALS—of which anon.

Pies may be rendered wholesome or unwholesome, at the option of the maker. The union, however intimate, of bread and fruit, forms the best diet in the world. Keep out shortening and spices, and you may live wholly on pies. And excellent crust can be made of flour, potatoes, and milk, or water, without shortening. But I recommend such pies and all pies to be eaten, not after a full meal, but as a PART of it—and as the FIRST part rather than the last; because we eat them mainly as a relish, and all know how much keener the appetite is at the beginning than close of the meal. And if cakes must be eaten, let them be eaten also when the Chinese eat their relishes—first, not last; and at breakfast instead of supper.

Though we have spoken against eggs in cake, because baked so exceedingly hard, and commingled with melted grease; yet eggs, properly cooked, are undoubtedly wholesome and nutritious, as they certainly are exceedingly palatable. They contain great quantities of carbon, and also gluten, fibrin, and the very compounds required by animal economy. They are especially good for children. Yet very much depends on the mode of cooking them. Fried in grease, as "ham and eggs," or "pork and eggs," they are hard of digestion, as well on account of being generally over-done, as saturated with melted grease. Poached eggs are liable to a similar objection. But soft-boiled eggs, eaten with bread or other substantial food, are as useful as delicious. We recommend little if any butter or salt, because a little practice will render eggs

better alone than seasoned. Butter, salt, pepper, everything mixed with them, takes from, or obscures the taste of the eggs; yet it is this taste which makes us relish eggs as eggs.

SPICES and seasoning are thus brought up for inspection. Most condiments are decidedly injurious. Their very nature is irritating, heating, feverish. Like alcoholic liquors, they stimulate temporarily only to debilitate ultimately. They impart no inherent, protracted vigor to the system, but only goad, lash up, and then prostrate. Especially do they irritate, disease, and prostrate the stomach; and this organ diseased, the entire system suffers similarly.

But, worst of all, they blunt the taste and disorder the appetite. They necessarily, and always, benumb the nerves they touch, and of course deaden the power of taste, as well as deteriorate natural relish. They induce us to eat too much-because they temporarily stimulate, and because natural relish being blunted, we eat and keep eating, vainly attempting to make up in the quantity of food that gustatory pleasure lost by this blunting of taste. They also weaken the salivary glands. Mustard, peppers, cloves, ginger, cinnamon, and the like, I never eat; nor would I, under penalty of deteriorated relish and dyspeptic consequences.

Finally, let the principle, that whatever detracts from or obscures the natural taste of food, thereby impairs the luxury of eating, be always borne in mind and put in practice. The deliciousness is in the FOOD, not the spices—in the bread, not butter, or gravy, or sauce, or other things else eaten with it as relishes. And if we cannot enjoy simple food simply prepared, we cannot enjoy it with all the "seasoning" (improperly so called) with which it can be cooked or eaten. Whatever is fit for food, nature has already seasoned for us infinitely better than art can season it[33]. And since condiments both obscure nature's rich flavors, and also blunt our powers of perceiving them, to say nothing of their deleterious consequences, practical wisdom dictates that food should be eaten with as few spices and relishes as possible. Yet modern cookery is all seasoning—a total perversion of nature's dietetic simplicity.

Confectionary is so closely allied to pastry as to deserve a

passing remark. Ice-creams are probably not objectionable, except when the stomach is over-heated. Their being frozen is their greatest objection. They may be eaten at, or right after meals, with comparative impunity, provided they are allowed to melt first. But candies in all their forms are very detrimental, because so very rich; because colored with poisonous ingredients; because usually eaten between meals or late at night; and especially because they pervert the relish, so that natural food tastes insipid, and rich food is sought to fill the vacuum they create. They are exceedingly liable to sour on the stomach, which they always overload, and thus stupify the brain, breed worms, and incite disease. Children especially should never be indulged in them. They also soon ruin the teeth. This is a sure sign that they first impair the stomach. But of these relations of the two to each other, hereafter. Confectionaries are public curses.

57. FRUIT

Next deserves consideration. That good fruit is one of the most delicious articles man can eat, all are practical witnesses. Honey and sugar are most delicious at first, but soon cloy, because their nutrition is so highly concentrated. Not so with good fruit. Let a person moderately hungry, sit down to a plate of honey, or butter, or sugar, and be loses his relish before he has taken a tithe of the real gustatory pleasure he can take in as many first-rate peaches, or pears, or apricots, or nectarines, or even apples or berries, as his stomach will bear. Than delicious fruit, what greater dainty can be served up to man throughout nature's ceaseless round of bounties? For what other luxury will men pay as high a price? Vergaluce pears often command one dollar per dozen. In France they often sell for forty cents apiece, and fifty cents for a peach have often been paid in Boston—more than treble the cost of ice-cream, than which they are certainly more delicious. Yet there are still better fruits than these. And what is more, all love good fruit. See how fruit-crazy all children are. See what enormous quantities of pears, peaches, strawberries, apples, etc., are consumed in our cities.

Now, since that is best which tastes best[33], and since fruit relishes better than anything eaten, therefore it is the most wholesome. It prevents or removes constipation, and often acts like a charm upon both body and mind. Different constitutions require different kinds, yet ripe fruit, if of the right kind, is better even in sickness than medicine; and, eaten with good bread, nothing is equally palatable or wholesome. This never cloys the appetite or clogs the stomach, but keeps the bowels open, head clear, passions cool, and the entire man healthy and happy. Just try the experiment. Sit down to a breakfast of first-rate fruit and Graham bread, and say if it is not the best breakfast you ever ate. Than peaches cut up and sweetened at supper, what is more delicious? Or than strawberries and cream with bread? Of choice pears this is still more true. Nor are berries with bread and milk so very inferior eating. And when none of these can be obtained, good apples, baked or raw, relish right well.

If it be objected that these choice fruits last but a short time, the answer is, that nature provides us with a perpetual round of them from May to November. Apples keep the entire year, and pears of the very best varieties can be kept till the appearance of strawberries the next year. A friend of the author had plums—Coe's golden drop—the first of June, which he had kept perfectly sound all winter, and the frost damson keeps till November; while the amber prim ordium ripens early in July. Many other kinds ripen along through the winter and spring. Pears and plums can be kept the year round as easily as apples; and summer fruits, by bottling, can be kept perfectly fresh a year. And by the use of hot-houses, fruit can be picked from the trees in winter or spring.

We can also preserve them or make them into jellies. Yet this process, besides deteriorating from their flavor, impairs their digestibility. Preserves are too rich. Their nutrition is too much concentrated. Yet the virtue of the juice can be extracted and then DRIED, so as to preserve its original flavor and dietetic utility. Or most kinds of fruit can be dried, and thus kept, though this process dries out much of its goodness

as well as sweetness. Yet dried fruit stewed, is far better than none.

Stewed apples sweetened, make an excellent relish with bread. Nor does the addition of butter increase its palatableness, but rather lessens it. Yet apple-sauce should be made every few days, and not made so rich as to keep all winter. Yet, after all, nothing equals simple bread and choice fruit, if people only knew it, both for health and luxury.

In general, good fruit loses much of its flavor and virtue by being cooked. Poor fruit may be improved by being cooked and sweetened; but first-rate fruit and bread ought to be good enough for a prince; and is in fact the best pie, and cake, and dessert, in the world.

GREEN fruit, however, is most pernicious. Nor do we realize how many, especially children, lose their lives directly or indirectly thereby. Where it does not kill immediately, it often deranges the stomach, breeds worms, and induces other diseases which, sooner or later, complete the work of death begun by green fruit. Adults are most culpable for eating fruit before it is fully ripe. Nor would children ever eat it if supplied freely with what is good. Parents should see to it that their children have good ripe fruit as much as bread.

Most city fruits, especially peaches, are picked green, so that they may keep the longer. Those who would have good fruit must RAISE it—must pick it from their OWN vines and trees.

Foreign fruits are good, but indigenous are better. Nature adapts the products of every clime to its dietetic requisitions; and hence has made those fruits to flourish best in every clime which its inhabitants require. Yet imported fruits augment variety, and those which will keep well may be eaten freely with profit. Of these, oranges, lemons, pine-apples, bananas, and nuts, are examples. Lemonade is, in the author's opinion, as healthy as delicious. Yet he founds this opinion on experience rather than science.

58. SWEETS

Are as healthy as palatable[33]. They contain starch and carbon in great abundance, and these are two of the princi-

pal ingredients required in the nutritive process. Yet they should be commingled with our food just as nature has mixed them with all kinds of edibles. Sugar is extracted from the cane, the beet, and the maple, and even from corn-stalks ; and can be made out of almost anything that will serve for food. It should therefore be duly diluted, and then rarely cloys, but greatly enhances the palatableness of almost everything eaten, especially of "flour victuals." Sweet apples and fruit are much more nutritious than sour, and greatly facilitate the fattening of stock.

Molasses is especially good; because, besides yielding a great amount of nourishment, it stimulates the intestinal canal, and thus helps to evacuate obstructions and wasted matter. Eaten with Indian meal made into puddings or cakes, it becomes highly aperient, and thus carries off causes of disease. Let children be served with it at least once or twice a week, nor should adults eschew it.

Those slaves, and even cattle, who eat of the cane while extracting its sugar, are said to thrive remarkably well; and I am fully persuaded that if it also as well as its extract were imported, and extensively used as an article of diet, its usefulness would be great indeed.

Honey is also most delicious; and, duly mixed with other things, may be eaten with profit, especially in winter. Yet not in summer, because it is highly charged with carbon, and of this less is required in summer, but much in winter. Indeed, sweets generally should be eaten more sparingly in warm weather than in cold.

Yet, when honey and other sweets sour on the stomach, the latter should rarely be provoked by the former.

59. MILK, BUTTER, AND CHEESE,

Are highly nutritious, yet not wholly unobjectionable. Milk contains casseine, and this fibrine and albumen, in a highly soluble state, so that they can be easily carried to all portions of the system. Milk also contains nitrogen, a superabundance of which, so that it can be deposited and remain, is essential to growth. A milk diet is therefore peculiarly

adapted to promote the growth of children and youth, and the fact that nature has ordained it as the natural food of infants, is no mean guaranty of its utility. Its promotion of the growth of young swine, still further recommends it.

Butter, made from the oily properties of milk, contains a great amount of carbon. Its nutrition, like that of sugar and honey, is highly concentrated. Butter also soon becomes rancid, when exposed to heat, as it always is in the stomach, and in this form is peculiarly obnoxious. It often causes cutaneous eruptions, biles, and the like; and eaten in warm weather, and in those quantities in which it is generally consumed, loads the system with corruption, renders many miserable for life, and hurries thousands into untimely graves.

Cream is better than butter, and certainly more palatable, and may be eaten with bread, or bread and fruit, with comparative impunity, at least in cold weather. Other stomachs may manage butter, but mine cannot, except in small quantities; and it proves detrimental to dyspeptics generally. Spread thin upon bread, it may do for adults, but children should eat but little, and be satisfied with milk in its stead. Sweetened cream is far more palatable and less objectionable.

Milk also promotes sleep, and hence is the better for supper, especially for the supper of children, and probably for the wakeful. Sour milk and butter-milk sweetened, are probably both nutritious and healthy—more so than sweet milk, because milk must be curdled before it can be digested. The author attributes his recovery from a consumptive attack to the use of butter-milk, and relishes sour milk sweetened much. The Germans strain all their sweet milk into sour, and thus curdle it; and some cannot eat milk unless it is previously curdled. Curdled by adding sweet cider, it becomes delicious and wholesome.

Melted butter, as eaten on warm bread, or on hot, short, or buckwheat, or wheaten cakes, is most pernicious. I must be very hungry, before I eat food thus exceedingly unwholesome. Meat is far less detrimental. Buckwheat cakes of themselves are probably harmless, yet swimming in melted butter and molasses, they can be borne only by few. Add

milk or cream, with sugar, or molasses, or honey, and they are even more delightful to the palate than with butter, and doubtless as wholesome as delicious[33]. Meat fried in butter is very injurious. When the system is in want of carbon, butter may be eaten with profit, yet cream is better; but since carbon superabounds in almost all, so as to cause much disease, butter only enhances both this superabundance and its diseased consequences.

Cheese does not suit some stomachs, the author's included, yet may not be peculiarly unwholesome. It often troubles children, and should be administered to them sparingly, if at all. Yet pot-cheese, made of sour milk, is nutritious, and probably harmless.

60. PEAS, BEANS, POTATOES, ONIONS, BEETS, CARROTS, TURNIPS, SQUASHES,

And vegetables generally, may be eaten freely, with profit. Ripe beans and peas contain a great amount of nutrition, "stick to the ribs," make good blood, and should not be allowed to fall into disuse. Made into soups they relish well, and constituted a standing article of the diet of our ancestors. Daniel of old fared well, and looked fair, on lentils.

Potatoes, a recent but popular article of diet, deserve all the practical estimation in which they are held. Though not very nutritious, yet on this very account they "fill up," and thus prevent our taking excessive nutrition in other forms. Baked, they are very fine, and palatable however prepared. Yet they should be eaten with bread, or their bulk will be too great for their nutrition. Potatoe-starch pudding is one of the most nutritious and easily digested articles of diet to be found.

Onions are both palatable and wholesome. The French consume them freely. They are especially good in colds. The ourang outang, when suffering from colds, eats them raw in great quantities, and would eat nothing else. They are aperient, and their syrup, sweetened, relieves oppressed lungs, and restores suppressed perspiration. For incipient infantile colds, it is admirable.

Beets, carrots, and turnips, are good in their places. Every family should feed on them often. Parsnips are probably good, yet rather difficult of digestion.

Cabbages digest with difficulty, and yield but little nourishment. Only strong stomachs can master them.

Greens in the spring are aperient and healthy, yet need not be soaked in vinegar to be rendered palatable.

Squashes and pumpkins are good, either stewed or eaten as sauce, or with bread, or made into plain pies. Yet they should not be spiced to death, or till their taste is nearly obliterated, and utility rendered doubtful[56]. To some constitutions, squash is especially serviceable.

61. CUCUMBERS, RADISHES, AND IMMATURE ESCULENTS,

Are especially injurious. To children they often prove fatal. They ought never to come upon the table. How sensible persons can eat, or let their children eat them, I cannot imagine, except in ignorance of their dietetic effects. What, jeopard life for a momentary gratification!

Green corn is also pernicious. Green corn, cucumbers, and radishes never appear on my table, when only my own family are to be seated at it. In fact, green potatoes, very young peas and beans, and immature esculents of all kinds, ought never to be eaten. Wait till they get their growth and virtue.

62. NUTS,

As generally eaten, are unwholesome, for two reasons. They are often eaten between meals, which we shall soon see to be highly injurious, and when the stomach is already overloaded. Secondly, they contain a great amount of carbon, and thus increase that superabundance of it which is one great cause of disease. Yet eaten with, and as a part of food, they would undoubtedly prove highly beneficial, as they are eminently nutritious and palatable[33]. The inhabitants of the South of France, Savoy, and a part of Italy, live almost exclusively on chestnuts during fall and the early part of winter, making them into bread and puddings in place of flour.

Nuts abound in vegetable oil, and of course in carbon, and also in glutine and fibrine—three of the most important elements required for sustaining life. Yet they should be dried or cooked. But we shall discuss their dietetic value more fully when we come to speak of animal heat.

But to do full justice to this whole subject of the selection of food, would require an entire volume. This our restricted limits prevent. Yet having expounded nature's dietetic landmarks, the reader can easily fill up the details.

SECTION III.

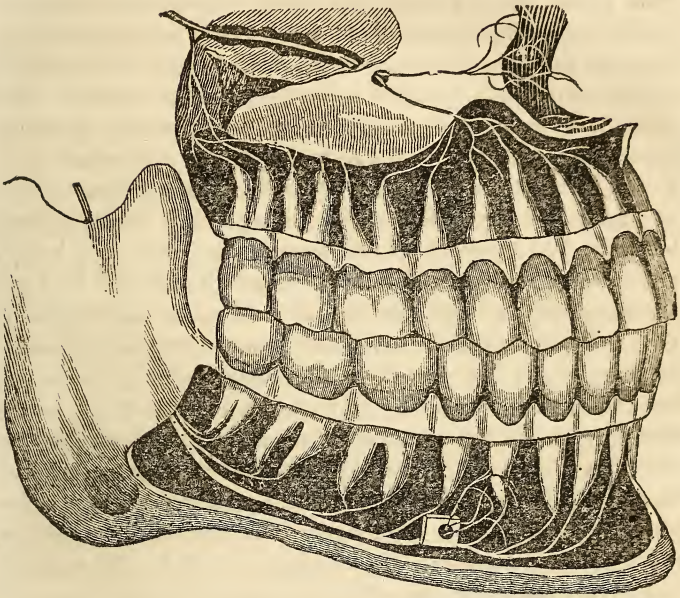
HOW TO EAT; OR MASTICATION, QUANTITY, TIME, ETC.

63. MASTICATION.

OUR food once selected in accordance with the foregoing principles, the next question is, How shall it be eaten? With teeth, of course, never with the stomach. Nature forbids our throwing it into its receptacle as with a shovel. By rendering its only passage way small, she literally COMPELS us to deposite it in small parcels. She has also furnished us with a mouth, set all around with two rows of teeth, which fit exactly upon each other, and are every way adapted to crushing our food to atoms, as will be seen from the accompanying engraving and description of them. Nor can we swallow our food without its being more or less chewed.

To persuade as well as compel such mastication, nature has rendered it highly PLEASURABLE. Instead of food being tasteless, she has given it a far more delicious flavor than all the spices of India could impart. Yet man does not know how to enjoy a tithe of the gustatory pleasure she has appended to eating. Not one in thousands know how to eat! Not that all do not know how to eat enough, yet few know how to eat LITTLE enough[65]. All know how to eat fast enough, but very few know how to eat slowly enough. And strange as it may seem, few know how even to CHEW, simple, easy, and natural as this process is! Nine hundred and ninety-nine in every thousand, eat mostly with their STOMACHS instead of with their teeth! One would think that this poor slave had to perform two or three times its wonted task, simply to digest the enormous quantities of heterogeneous compounds forced upon it, instead of being compelled, in addition, to do what the teeth should previously have done. Yet this practice is universal. Is eating indeed so very onerous a task that it should thus be hurried and slighted? Most men pitch and shovel in their food in great hunks, mouthful following mouthful, thick and

64. THE TEETH—THEIR NAMES AND DESCRIPTION.



No. 7. The Teeth.

The two front teeth in the upper jaw are called the median incisors; the two next on each side the lateral incisors; the two next the canines or eye teeth; the two next the first bicuspidati; and the two next the second bicuspidati; the six next, three on each side, the molars or sapientia—sixteen in all. Those opposite to each of these respectively, in the under jaw, are called by the same names, and swell the entire number to thirty-two.

These teeth are composed of bone, cased with the hardest substance in the human body, called ENAMEL, to prevent their breaking. They are kept in their places by fangs and muscles, and rendered sensitive by nerves which pass up into them by fissures or holes in the centers of their fangs. The inflammation of these nerves by exposure occasions the toothache.

fast, which they give a twist or two, hit a crack or two, and poke down "in a jiffy;" eating in five minutes as much as would take a full hour to eat well. Americans generally treat eating as they treat impertinent customers—dismiss it without ceremony for something appertaining to business. Yet, than the due FEEDING of the body, what is more important[29]? Of course the time occupied in eating should correspond. Besides, how can we expect to enjoy the gustatory pleasure nature has associated with eating, unless we take ample time for such enjoyment? Instead of dispatching our meals to get to business, we should dispatch business, and eat at perfect leisure. We should never sit down to the table in a hurry, or till we have dismissed from the mind all idea that we have anything else on hand, and should then eat as leisurely as if time and tide waited for us. The ox and horse eat as quietly as though their food was their all. Only swine guttle down their food. And well they may; for their tastes are so coarse that they eat what is most loathsome, and derive their pleasure from quantity mainly. Shall man imitate the swine? Shall he bolt his food and hurry off to business, and thus forego gustatory enjoyment, and also shorten his days; thereby curtailing that very business he is so anxious to do? Take ample time to eat well, and you will live probably twice as long, and this protraction of life will enable you to do the more business. Eating fast is the worst possible stroke of business policy you can adopt. Let business stand, while you eat with the utmost deliberation. Let NOTHING hurry you to, or at, or from the table. Make eating a PARAMOUNT business, and the acquisition of wealth, a trifling toy in comparison. No one should deposite an ordinary meal in less than an hour. How foolish to cram it down with swinish voracity in five minutes! Yet sapheads often make quick eating their BOAST.

Though the loss of gustatory enjoyment—that most delightful repast—consequent on eating fast, is great and irreparable, yet this is one of its smallest and lightest evils. It breaks down the stomach, and thus unmans and diseases the entire system. No other cause, if even a combination of causes, is as prolific of dyspepsia and all its dire array

of evils, as this. We have not overrated the importance of a due selection of food, yet its proper mastication is far more important. Eat slowly and masticate thoroughly, and the kind of food eaten, however noxious, will rarely break down the stomach, but eating the best selection of food fast will ruin almost any stomach. How can the gastric juice penetrate the food unless it is mashed fine? Food deposited in chunks defies its solvent power for a long time, meanwhile irritating and weakening its power; whereas, if it were well crushed before it entered the stomach, this juice could penetrate or get hold of it, and digest it before fermentation occurred.

64. SALIVA, ITS OFFICE, AND ADMIXTURE WITH FOOD.

Nor is this all. Food must be thoroughly SALIVATED as a means of being thoroughly crushed. Hence nature has stationed five glands about the mouth, two at the back part of the jaws called the parotted, two at the sides of the lower jaw called the sub-maxillary, and one under the tongue called the sublingual, always found at the root of boiled tongues, which secrete a half-watery, half-stringy viscid called saliva, and discharge it into the mouth when food is presented. Chewing mingles this saliva thoroughly with what we eat; nor without it can we grind food perfectly fine, as all troubled with dryness of the mouth while eating, will witness. Such dryness is occasioned by the weakness of these glands; but when healthy, the presence of food in the mouth provokes them to secrete and discharge great quantities of this saliva, and even the sight of food "makes the mouth water." Tantalize a hungry dog a few minutes with the sight of his dinner without giving it to him, and this saliva will run out at the corners of his mouth, and hang down in transparent gelatinous strings. That clear, tasteless spittle which lubucrates every healthy mouth, especially while eating, is composed mainly of saliva.

This secretion was not created for nought. It fulfils some IMPORTANT end in the nutritive economy, else it would not exist—especially in such great abundance. Probably half its virtues are not yet known; but the following chemical analysis

of it, and some of its effects on food, attest both its utility and absolute necessity.

"M. Mialhe has recently made numerous researches with reference to the physiology of digestion. The essential basis of the alimentation of animals, he states, is constituted by three distinct groups of bodies: albuminous, fatty, and saccharine matters. The labors of modern chemists have shown that albuminous substances become assimilatable through the assistance of the gastric juice, which, by its acid, swells these azotized products, and by its *pepsin* liquefies them, a phenomenon analogous to that of diastasis on amidon. Fatty matter becomes assimilatable by the intervention of bile, but with regard to feculaceous and saccharine matter, says M. Mialhe, there is nothing positive known. This lacuna in science he has endeavored to fill.

"The new facts at which M. Mialhe has arrived, tend to show that all hydro-carbonaceous substances can only undergo the phenomenon of assimilation when they have been decomposed by the weak alkaline dissolutions contained in the vital humors; either immediately, as with glucose, dextrine, sugar of milk; or mediately, as with cane-sugar and amidon, which have to be first transformed in the economy, the one (cane-sugar) into glucose, the other into dextrine of glucose. As to hydro-carbonaceous substances, which are neither susceptible of fermentation nor of decomposition by weak acids, or alkalies in solution, such as lignite or mannite, they escape, in man, the digestive and assimilating action. But by what chemical action is the amidon transformed into dextrine and glucose? Numerous experiments have proved to M. Mialhe that this transformation is produced by the saliva, through a principle which the humor contains, a principle comparable, in every respect, to *diastasis*. In order to isolate it, human saliva, first filtered, is treated by five or six times its weight of alcohol, alcohol being added until precipitation ceases. The *animal diastasis* is deposited in white flakes. It is gathered on a filter, from which it is taken still moist, and dried in layers on glass, by a current of warm air, at a temperature of from 40 to 50 degrees (centigr;) it is preserved in a well-stoppered bottle. This active principle of the saliva is solid, white, or of a grayish white, amorphous, insoluble in alcohol, soluble in water and weak alcohol. The aqueous solution is insipid, neutral; the sub-acetate of lead does not give rise to precipitate. Abandoned to itself, it soon becomes acid, and whether or not in contact with the air. This *animal diastasis*, studied comparatively with diastasis extracted from germinating barley, presents the same mode of action. It transforms amidon into dextrine and glucose; acting on starch, and elevating the temperature to 70 or 80 degrees, the liquefaction is nearly immediate. One part of this substance suffices to liquefy and convert two thousand parts of fecula. The agents, such as creosote, tannin, the powerful acids, the salts of mercury, of copper, of silver, etc., which destroy the properties of *diastasis*, act in the same manner with respect to the active princi-

ple of saliva. At an equal weight they both liquefy and transform the same quantity of hydrated amidon. It appears, even, that the active principle of germinated barley is seldom as energetic as that of saliva, which is owing to the greater facility of obtaining the latter in a pure state. Finally, as a last resemblance, the *animal diastasis* existing in the saliva of man rarely exceeds two thousandths, and this is exactly the proportion of the diastasis contained in the germinating barley."—*Lancet.*

Its wonderful solvent powers—converting TWO THOUSAND TIMES its own quantity of fecula—one of the principal ingredients of food, and its liquefying starch—is the point to which special attention is invited. It thus appears that saliva, besides facilitating mastication and deglutition—for without it food would be too dry to be swallowed easily—in part dissolves the food, and prepares it for the action of the gastric juice before it enters the stomach. As cotton must go through several PREPARATORY processes before it can be woven; ground plowed before it can be planted, etc.; so food must be both ground fine by mastication and saturated with saliva, till the starch of food, one of its most nutritive elements[51], is liquefied and prepared for the digestive process. How deeply important, then, that we thoroughly chew our food, and also that we keep these salivary glands in a healthy, sound, and vigorous state! The stomach has abundance of hard work to perform, after thorough mastication and salivation have prepared the food for digestion. Especially is this true of weak stomachs. Nor can the digestive process be complete, or make good blood, without this preparation. The reader will please note this principle, as we shall found several important directions to dyspeptics on it, when we come to treat of the cure of disordered digestion.

The food is next swallowed, or passed down the æsophagus, or meat-pipe—a long duct connected with the back part of the mouth, (see engraving of the stomach,) and furnished with longitudinal and transverse fibres, which, contracting from above downwards, impels its contents down into the stomach; but, contracting from below upwards, as in vomiting, expels the contents of the stomach upwards, into and out at the mouth, often with great force.

65. THE RIGHT QUANTITY OF FOOD.

Important as are its right selection and due mastication and salivation, its QUANTITY is probably still more so. Unwholesome kinds engender far less disease and suffering than excess in AMOUNT. Health and disease depend vastly more on HOW MUCH we eat, than what. Many, especially dyspeptics, far more than counterbalance all the good effects of a plain diet, by over-eating. Not that the gormandizing of plain food is not far less injurious than that of unwholesome kinds, but that excess in quantity is even more unhealthy than quality. Nor is it exaggeration to say, that most civilized nations, and even individuals, make perfect gluttons of themselves. This is doubly true of Americans. An English Quaker on his return from a transatlantic tour, when asked what he thought of the Yankees, returned answer that "Their men are all gluttons, and their women all slaves." Notice the disappearance of dishful after dishful, and even tableful after tableful, at our public and private meals. Watch your own plate, and notice how many times, though it is loaded to begin with, you "back up your cart" for another load. All this besides the desserts. Though we may not eat as much as the Indians, who are reputed by several travellers to stuff themselves with from six to fifteen pounds of meat per day, when they can get it, and even eat a great portion of their time, yet, on the average, we eat at least from two to three times more than nature requires. Nearly every reader will bear the self-condemning witness, that he often eats so enormously as to feel uncomfortable, stupid, and often almost sick; and most who will omit an occasional meal, will feel twice as well for a day or two afterwards. But, to bring our remarks to a point, notice

66. THREE CLASSES OF FACTS,

Everywhere observable. Dyspeptics eat enormously—nearly twice as much as ordinary persons, while those who enjoy PERFECT health, and have never been sick, eat less than half as much as others, and not a quarter as much as dyspeptics. The bully of the Erie Canal in 1837, and of course the

strongest, spriest, and toughest man of all those powerful navigators of that extended water, ate less than half as much as the average of his passengers. A comb-factory man in Newbury, Mass., who has always enjoyed the very best of health, is surprisingly abstemious in the quantity of his food. Aged persons usually eat very little, and hence their length of life. Men of great talents and virtues usually practice rigid abstinence. Wesley furnished a noted example. See what he did and endured—how little he ate and how often he fasted. And Bible recommendations and requisitions of fasting are undoubtedly founded on this law.

Fleshy persons usually eat lightly, while spare persons, the world over, are generally great eaters. The reason is this: What the former do eat, they completely digest, extracting from it all its sustaining virtue, so that they need but little; whereas gourmands disorder their stomachs, so that the enormous quantities they consume are not converted into nourishment. A little food, well assimilated, yields far more nutrition and life than quantities crudely digested. In fact, gluttony doubly starves its subjects; first enfeebling and disordering digestion, so that it cannot extract the nourishment from food, and secondly, by a gnawing, hankering, craving state of the stomach, akin to starvation.

67. PARR, CORNARO, DR. CHEYNE, DR. JOHNSON, AND OTHERS.

Old Parr, who became a father after he was one hundred and twenty, and retained his health and all his faculties unimpaired till he visited the royal court, aged one hundred and fifty-two, died in about a year, from slightly letting down his extreme abstemiousness.

Louis Cornaro, who, by abandoning those excesses which broke his constitution and threatened him with death at thirty-six, baffled disease in its most aggravated form, by confining himself to less than twelve ounces of solid and exclusively vegetable food per day, was over-persuaded to increase this quantity only two ounces, the effects of which he describes as follows: "This increase, in eight days, had such an effect upon me, that from being remarkably cheerful and brisk, I

began to be peevish and melancholy, and was constantly so strangely disposed, that I neither knew what to say to others, nor what to do with myself. On the twelfth day I was attacked with a violent pain in my side, which held me twenty-two hours, and was followed by a violent fever, which continued thirty-five days, without giving me a moment's respite." This was his only sickness during sixty-three years of abstemiousness.

Richard Lloyd, "a strong, straight, upright man, wanting no teeth, having no gray hairs, fleshy and full cheeked, and the calves of his legs not wasted or shrunk, his hearing, sight, and speech, as good as ever," at one hundred and thirty years of age, being persuaded to substitute a meat and malt-liquor diet, for one consisting exclusively of bread, butter, cheese, whey, and buttermilk with water, "soon fell off and died."

Dr. Cheyne reduced his weight from four hundred and forty-eight to one hundred and forty pounds by abstinence, grew corpulent and sick on a more generous diet, and was restored by abstemiousness. His practical and theoretical model was, "The lightest and least of meat and drink a man can be tolerably easy under, is the shortest and most infallible means to preserve life, health, and serenity."

Dr. James Johnson, one of the ablest of modern physiologists, who cured himself of an aggravated dyspeptic malady by rigid abstemiousness, and then wore out two armies, in two wars, and thought he could wear out another, says: "The quantity should never exceed half a pound in weight at dinner, even when that can be borne without a single unpleasant sensation succeeding. It is quite enough, and generally too much. The invalid will acquire a degree of strength and firmness, not fulness, of muscle, on this quantity, which will, in time, surprise his friends as well as himself." "Such will often derive more nourishment and strength from four ounces of gruel every six hours, than from half a pound of animal food and a pint of wine."

68. THE AUTHOR'S EXPERIENCE

Fully confirms these converging testimonials. When so crowded with professional calls that he was obliged to postpone meals or dismiss customers, he occasionally chose the former, and soon found that it doubled and trebled his capability to endure mental labor; and soon adopted the practice of fasting whenever he was pressed with business, and preparatory to lecturing. To eat supper before lecturing, always greatly mars and enfeebles both matter and manner, so that he always prepares himself for the desk by fasting; and to write on a full stomach is an utter impossibility. No one who has not frequently practised rigid abstemiousness in quantity as well as quality, can appreciate the far greater flow of thoughts, words, and facts, and the enhanced clearness of mind and intensity of feeling, produced by fasting. It may indeed be carried so far as to prostrate, yet even a state of hunger quickens mental action, while a full meal is as lead tied to the soaring eagle. I find the less I eat the more I think. I have crippled months and years of my precious life by overloading my stomach, and thus proclaim my own faults that others may take warning. But I am determined to commit this sin no more. Shall I—will you—longer fetter the immortal MIND, by indulging appetite? Shall propensity blight the godlike powers of the human soul? Gluttony is the great sand-bank of mind. Nor is there any telling how much abstinence would enhance the progress of our scholars, the mental and moral powers and consequent usefulness of ministers, and the intellectual acumen of all who require mental strength and activity. Nor do the feelings escape this palsying grasp of over-eating. They even suffer most. It blunts and benumbs all our keener, finer, holier emotions, and curtails enjoyment more universally and effectually than almost any other cause, besides all the untold anguish of body and mind it induces. The extent and magnitude of the evils of intemperance in drinking, though they far exceed even the glowing descriptions of all its opponents combined, fall far, very far, below the evils of excessive eating. The former are limited comparatively to few; the latter is almost universal,

and practised from the cradle to the grave. Mothers begin by choking their infants with the breast every time they cry, though this very crossness is generally occasioned by excessive nursing; and still aggravate the evil by stuffing, stuffing, stuffing their children with pies, cakes, candies, nuts, apples, and the like, from the time they rise till they retire, year in and year out, so that most children GROW UP gourmands. And this soul-and-body destroying habit "grows with our growth, and strengthens with our strength."

"I tell you honestly," says Dr. Abernethy, "what I think is the cause of the complicated maladies of the human race. It is their gormandizing, and stimulating, and stuffing their digestive organs to excess, thereby producing nervous disorders and irritation." Another eminent medical writer says: "It is the opinion of the majority of the most distinguished physicians, that intemperance in diet destroys the bulk of mankind." "Most of all the chronic diseases, the infirmities of old age, and the short period of the lives of Englishmen, are owing to repletion."

"And I do firmly believe," says President Hitchcock, "that scarcely any sedentary or literary man can exceed from twelve to sixteen ounces of solid food, and from fourteen to twenty-four of liquid per day, and keep within the bounds of temperance." Soldiers are more vigorous and healthy on scant than on full rations. Pugilists are fitted for the bloody ring, and horses for the race, by great abstemiousness combined with extreme exertion of muscle, which proves that abstinence facilitates labor. In short, every dietetic fact and principle goes to establish these two conclusions, that all eat double the quantity of food necessary for the attainment of the highest state of mental and physical vigor and endurance, and that over eating is the great cause of modern disease and depravity. One and all, TRY ABSTEMIOUSNESS: the well, that they may retain and enhance health; invalids, that they may banish feebleness and maladies, and again enjoy the blessings of health; the literary, that they may augment mental efficiency; laborers, that they may increase working ease and capability, and, above all, the sedentary, that they

may ward off the impending evils of confinement within doors. I would have no one eat one mouthful too little—rather too much, for nature can cast off surplus food better than supply or endure its deficiency—but the exact quantity most promotive of strength, talents, and happiness, is incalculably preferable to either too much or too little. How much is best we proceed to show.

69. APPETITE, A TEST OF THE PROPER QUANTITY OF FOOD.

Appetite is a perfectly certain guide to quantity as well as kind [33], when it is normal or unperverted. We have too often proved the principle here involved to require its repetition. Yet, alas! so perverted is the natural appetite of almost all, that it is a drunken pilot in a storm. Indeed, it is far worse than no guide, for it leads ASTRAY. To lose this infallible guide in so important a matter, is most unfortunate; but by constantly tempting to over eat, it engenders a great portion of those very maladies and sufferings you and I, reader, and all mankind, experience, and is abridging the period of our and their existence at least one half!

The fact of this abnormal condition of appetite is rendered apparent by its cause. That a most intimate inter-relation exists between the stomach and Alimentiveness is rendered perfectly clear both by Phrenology and Philosophy. The latter is the organ of the former, and therefore the inter-relation of all their states with each other is perfectly reciprocal [17]. This reciprocity must be perfect, in order that when the stomach requires food, it may excite the feeling of hunger in Alimentiveness. But for such inter-relation, the stomach could never make known its requisitions for food. The perfection of the nutritive process demands such reciprocity, and that it be PERFECT. Whatever, therefore, inflames the stomach, thereby excites Alimentiveness and creates cravings akin to hunger. Excess of food necessarily inflames the stomach, and of course always provokes those hankerings after food, which most of us mistake for real hunger. Yet such cravings are caused, not by hunger, but by SURFEITING. This shows why dyspeptics generally have such enormous appetites.

They have inflamed their stomachs, and this renders their appetite morbid, and its cravings insatiable. And the more such eat, the more they crave. Let them eat and eat by the hour together, they still feel what they call hungry, though it is to true hunger what fever is to the circulation. Eating, so far from sating this morbid craving, only enhances it. True, they feel weak, gone, faint, and ravenous—feel that they shall drop down, unless they can get something to eat soon—yet the more they eat the more they crave, because the more they inflame the stomach, and of course its cerebral organ, Alimentiveness. Cannot such see that they eat twice as much as men in general, and four times more than many around them who enjoy uninterrupted health? How can they require so much when others get along so much better with so little? What could more conclusively prove that both their craving and diseases proceed from their gluttony? And what establishes this point beyond a doubt, is that protracted abstemiousness will diminish these stomatic gnawings. Make trial, ye thus afflicted, and you will be surprised at their decrease. And, in general, those who feel faint in the morning till they eat, ravenous before dinner, and hungry before supper, should attribute these cravings to an OVERLOADED stomach instead of to an empty one. And they who suffer much from omitting a meal may depend upon it that they over eat. Fasting gives little inconvenience to healthy stomachs; nor is there a more sure sign of gluttony than these hankerings, and this faintness when a meal is omitted. Contradictory though it may seem, yet of all such cravings persevering abstemiousness is a perfect cure, because it allays that irritation of the stomach which causes them, and which full feeding enhances, and thereby reinflames appetite. Only try its virtues, ye thus afflicted. FAST instead of feast; and keep fasting till you can, like those in health, omit meal after meal with little inconvenience or prostration. Especially should such omit supper, and drink copiously of cold water an hour before breakfast.

"Whenever," says Dr. James Johnson, "our food is followed by inaptitude for mental or corporeal exertion, we have trans-

gressed the rules of health, and are laying the foundation for disease. Any discomfort of body, any irritability or despondency of mind, succeeding food and drink, at the distance of an hour, a day, or even two or three days, may be regarded, other evident causes being absent, as a presumptive proof that the quantity has been too much, or the quality injurious. If a few hours after his dinner, he feel a sense of distension in the stomach and bowels, or any of the symptoms of indigestion which have been pointed out; if he feel a languor of body, or a cloudiness of the mind; if he have a restless night; if he have experienced a depression of spirits, or irritability of temper next morning, his previous meals have been too much, or improper in kind, and he must reduce and simplify till he come to that quantity and quality of food and drink for dinner, which will produce little or no alteration in his feelings, whether of exhilaration immediately after dinner, or of discomfort some time after this meal. This is the criterion by which the patient must judge for himself."

The fact is, we may accustom ourselves to eat little or much at pleasure, with this difference, that the former habit leaves the muscles and brain unoppressed and active; the latter stupefies the whole man by diverting the energies from all the other organs and concentrating them in the brain. Agents and tourists among the Indians concur in the declaration that they will eat from six to fifteen pounds of meat in the twenty-four hours, spending most of their time in eating it when they can get it. "For a few days," says Captain Duval, "after getting into camp, he will eat from eight to ten pounds, and for the first day or two would even exceed that quantity." "The Osages," says Captain Rogers, "often eat from ten to fifteen pounds of fresh meat in the course of the twenty-four hours, particularly on returning from a fatiguing hunt, when I have no doubt they frequently consume from five to six pounds at a meal." Mayor Armstrong says, "They would consume from six to eight pounds per day,"—a quantity "under instead of over the true estimate." Mr. Robert Cook says, "I have seen a prairie Indian eat and destroy, upon his arrival in camp, fifteen pounds of beef in twenty-four hours. I am further of opinion

that they will eat daily ten pounds throughout the year." Of the amount of food eaten by the Esquimaux, John Ross says, "Their consumption of food is enormous, and often incredible. They eat, perhaps, twenty pounds of flesh and oil daily." Sir W. E. Percy weighed out to a half-grown Esquimaux boy eight pounds of sea-horse-flesh, one pound twelve ounces of bread, one pint and a quarter of rich gravy soup, a gallon of water, and six wine-glasses of spirits, a "quantity no way extraordinary."

Of the Siberian Yakuti, Captain Cochran says the Russian Admiral Saritcheff gave to a Yakut, who was said to have eaten in twenty-four hours, "the hind quarter of a large ox, twenty pounds of fat, and a proportionate quantity of melted butter for his drink"—"a thick porridge of rice boiled down with three pounds of butter, weighing together twenty-eight pounds, and although the glutton had already breakfasted, yet did he sit down to it with great eagerness, and consume the whole without stirring from the spot." Captain Cochran adds, that a good calf, weighing two hundred pounds, "may serve four or five good Yakuti for a single meal. I have seen three of these gluttons consume a reindeer at a single meal."

Barrow says, "Ten of our Hottentots ate a middling sized ox, all but the two hind legs in three days, but they had very little sleep during the time, and had fasted the two preceeding days. With them the word is eat or sleep." He adds of the Bosgesmans, "The three who accompanied us to our waggons, had a sheep given to them about five in the evening, which they entirely consumed before noon the next day."

The author's father once knew a glutton who ate two chickens, with the usual accompaniements of bread and sauce, and called for more. The dinner, prepared for eight workmen, was next brought on, which he dispatched, they not having been called, and when he called for more still, bread and a cheese were set on. When the landlord reproved him for cutting the cheese in slices instead of in towards the center, he replied, "that it made no difference, since he calculated to take the whole," to avoid which the landlord started on a drove of cattle he was driving, and thus hurried him

from his unfinished meal, though he took in his hand a large slice of bread and another of cheese.

Germans, as a nation, are great eaters, while Spaniards and French live comfortably on very little, but the former are no more healthy than the latter. And the world over, great eaters are exceedingly stupid and indolent. Of this, the Indians, Hottentots, and Yakuti are examples. Then why stupefy ourselves by gluttony? Or why follow appetite as our guide to quantity? Those who crave and consume great quantities of food do so from gluttony not necessity. Such, so far from freely indulging their appetites, and thus enhancing their voracity, should reduce it by abstinence. Nor need they fear starvation. The Spaniards do not suffer for want of food, but eat all that unperverted nature requires. And all that any one requires more than this is unnatural—the demands of a depraved appetite, not of nature. Let us seek and follow NATURE's standard, not our own inordinate cravings, and the result will be increased mental and physical capability and enjoyment.

While, therefore, natural appetite is nature's infallible guide to the right quantity of food, yet I warn every reader that his appetite is perverted, and if followed, will breed debility and suffering—it being with quantity as already explained in regard to kind[34]. So that here, too, as there, we must practice temporary self-denial till both the stomach and Alimentiveness regain their healthy tone. I err in saying "self-denial;" for, be it ever remembered, that this very fasting will enhance even our PRESENT as well as future gustatory pleasure. These unnatural cravings can neither appreciate nor enjoy the delicious flavor of food, but seek in quantity the pleasure lost in a blunted appetite. Let these fainting hankerers omit supper, and they will take double the pleasure in two daily meals they now take in three. Such, to be epicures must first be stoics. Those convinced of over-eating will now enquire

70. HOW APPETITE CAN BE RESTRAINED?

Doubtless most readers conscious of excess, would give almost anything to know how they can manage to govern this incessant craving? Every little while they suffer from excess, and firmly resolve to eat less, and succeed at a single meal only to eat the more afterwards. Indeed, few things are more difficult than to govern a morbid appetite, whether for alcoholic liquors, or unhealthy viands, or excessive quantities of food. He that can do this, can march to the stake. To rule a kingdom is play compared with controlling a morbid appetite. Yet this is not so difficult after we know HOW. Many try hard enough, but do not try RIGHT. Follow the succeeding directions and this task will soon become easy.

FIRST. Take upon your plate, in one or two parcels, all the food, except perhaps the dessert, you think best to eat at a meal, even though it may seem to be a "cart-load," and leave off when that is finished, instead of "backing up your cart" for another load. By this means alone can you fully realize how much you do eat. Or if this is impracticable, notice how much you have previously taken, so as to bear in mind the sum total consumed. But if you take potatoe after potatoe, and slice after slice of meat, and bread, and the like, relying upon an already inflamed appetite for your guide to quantity, or till your stomach, stretched by a thousand surfeits, is pained by fulness[69], be assured you will over-eat. Weighing a few meals, till you have learned to estimate correctly by the eye, and never exceeding twenty ounces per day of solid food—and from twelve to sixteen will be found ample for both the sedentary and laboring—will soon aid you in curtailing appetite. When pressed with business or writing, I limit myself to a pound or less of bread per day, exclusive of fruit, and eat nothing besides.

Especially should every meal of every child be measured out to them on setting down to the table, with the full understanding that they can have no more till the next meal. They will thus grow up to this much desired limitation. The Scotch custom of placing before each child all it is to have

at that meal, every mother should apply to her children, and all adults to themselves. Never make them eat to save.

SECONDLY. Eat it in SMALL MOUTHFULS. When we cram in great mouthfuls, and chew only till we can barely swallow, and then hurry in as much more as the mouth will hold, we eat far greater "cart-loads" in a short time than we suppose. But when we take a small quantity at a time, and chew it till it is fitted for deposite in the stomach, instead of a great pile of food seeming little, a little will go a great way both in satisfying appetite and in nourishing the body, meanwhile strengthening instead of impairing digestion. See some children eat. They take a small bite, and laugh, play, and talk, perhaps even while chewing it, and then take a little more, and thus spin out their eating a long time. Do likewise, and you will find it easier to stop eating a small meal than now a large one.

Besides, when you eat fast, and in large mouthfuls, the stomach hardly realizes how much food it has taken until it is almost crushed under its burden. Follow these simple directions—parcel out your meal at the commencement, and then eat in small mouthfuls at a time, and masticate thoroughly, and the government of appetite will be easy. But to govern a craving appetite while you eat fast is next to impossible.

A THIRD means of reducing the quantity of food consists in EATING SELDOM. This brings up for canvass another important dietetic condition:

71. FREQUENCY.

How OFTEN should we eat? Nature, not habit, should determine this point. Nor can I resist the conviction that one meal in the twenty-four hours is amply sufficient for all the purposes of nutrition. This may seem a fanciful chimera, but nature's division of time should determine the frequency of eating as well as sleeping. This division into day and night plainly indicates that we should eat once in twenty-four hours. About any more than this she says nothing. Yet if additional frequency had been necessary, she would have divided time accordingly.

If you think you could not go without food so long, remember that by eating every two hours you can habituate yourself to being hungry as often, or by accustoming yourself to two meals, as many do in winter, you feel quite as comfortable on two meals as on three with luncheons. Since we require more food, and that more frequently in cold weather than in warm, as will be seen under "animal heat," and since the increased labors of summers consume far less extra food than the extra cold of winter[96], therefore as we can live comfortably on two meals in winter, much more can we in summer, and without luncheon, of which presently. It is HABIT, not nature, which makes us desire three diurnal meals, and would require six if we were accustomed to eat thus often. The English must have a bite on rising, a breakfast, a luncheon, a dinner, and a supper, and then a plate of oysters, or bread and cheese, with ale, pick the cold bones left at dinner, or something of the kind, on retiring—six meals or luncheons per day—and think they cannot live without them all. Yet the ancients ate but one full meal per day, at four P. M., except their breakfast—a luncheon in hand about eleven A. M. The Thracians offered public thanksgivings to the gods because Cyrus and his army ate but one meal per day. And every one of the many with whom the author has conversed who have exchanged the three-meal system for the two, declare themselves much improved in mind and body thereby. With this my own experience fully accords. A breakfast at eight or nine, and a hearty dinner at three, are far better for me than a third meal; and a little practice has fully satisfied me that I could soon omit breakfast and supper without inconvenient hunger, and with great benefit. If laborers say they cannot endure work without their three meals, I tell them in return, how utterly puerile are their labors compared with the herculean exertions of the ancient soldiers, whether marching, or building, or besieging, or fighting! And since they endured so much on one meal, cannot you so little, or at least on two? Your stomachs, like your muscles, must have REST. This, three meals per day do not

allow, nor time to secrete new supplies of gastric juice, also indispensable to complete digestion.

Still I would not recommend a sudden change from three meals and a lunch to one, or even two, but begin with a light supper, then postpone dinner and omit supper, and after a year, or two, or three, eat only a light breakfast, and ultimately, if you choose, omit it also, though this I hardly recommend to any accustomed to three meals, yet think this habit preferable if formed in childhood. The error lies in the nursery. But of this in my work on "Maternity."

"But why not less and oftener?" it is enquired. Because the same quantity can be digested with far more ease at two, that at three or more times; because we are much less liable to over-eat on the two than three-meal system; and especially because the latter allows that rest which the muscles and nerves of the stomach require, quite as much as those of the arms, feet, eyes, or any other organ; and such rest greatly enhances its power. And with this view my own long and often varied experience fully accords. You may eat as often as you like, but let me eat only twice per day; and I wish I had the habit formed of eating only once.

But invalids, it is generally supposed, must eat often. The reverse. Their debility or disease prevents their consuming much of the energy derived from food, so that they require less, and their exhausted stomachs pre-eminently require rest. "There is nothing," says Dr. Cheyne, "more supremely ridiculous than to see tender, hysterical, and vaporish people, perpetually complaining yet perpetually cramming; crying out they are ready to sink into the ground and faint away, yet gobbling down the richest and strongest food and highest cordials." In fact, I know of no more effectual remedy, both for chronic invalids and the sick, than fasting. Why take food when they cannot digest it, especially since its presence only clogs and irritates? As gormandizing is one great breeder of disease, so abstinence is one great remedy. Whether infinitessimal doses of hœmopathy are potent or harmless, one thing is certain, that the dietetic prescriptions of this medical sect are most beneficial. Nor is the temperance regimen as-

sociated with the "water-cure" scarcely less efficacious as a restorative agent than this powerful remedial agent. Abstemiousness and water, rightly applied, will restore almost all to health, while frequent eating puts back almost all convalescents, and often induces a relapse, and hurries its victim, already renovated by sickness, and prepared for a return of health, into a re-opening grave. Even many convalescents, whom over-eating does not kill outright, are injured by it for life, and loaded anew with disease. Let all heed these warnings, thus frequent and palpable, and learn the abstemious lesson they teach.

73. EATING BETWEEN MEALS, LUNCHEONS, ETC.,

Next come up for reprehension. If two meals are sufficient for human sustenance, eating between three must certainly be injurious. The stomach, on receiving its allowance, empties into itself a copious discharge of that gastric juice which dissolves the food, and does not secrete another supply till all that meal is disposed of and another demanded. Hence, what we eat between meal-times must lay in the stomach undigested, only to irritate and disease. Besides, to interfere with this process by introducing a fresh mass into one partly dissolved, distracts and arrests its healthy action, and causes that first received to lay until incipient fermentation takes place—of the evils of which presently. Not once a month do I eat between meals unless just before or after, so as, in fact, to be a part of them, and always when I do, hear from it in the form of dyspeptic pains. Nuts, cakes, candies, apples, oranges, and the like, should, therefore, be eaten WITH meals, not between them; and those who violate this law must suffer the direful consequences of disordered digestion.

This principle condemns that motherly custom of giving pieces to children between meals. It will as surely derange their stomachs, and thus breed worms, as it is practised. I protest against it, and beseech mothers to give their children nothing between their regular meals. If they must have apples, nuts, and the like, see that they eat them just before or right after, or along with them; and if adults would enjoy

dainties, keep them till meal-time. Nor should luncheons ever be eaten. Do not disturb the digestive process. Many of us, by thus eating unseasonably, have undoubtedly inflicted aggravated pains and lingering maladies upon ourselves which will burden us while alive, and hasten our death.

74. THE BEST TIME FOR EATING

Also deserves attention. We should never take food just after rising, but wait till the stomach is prepared for it by exercise. Some urge inability to exercise till after breakfast, because of consequent faintness. This is the very reason why they should exercise. Its cause is, that stomachic inflammation, already explained[69], which can be cured in part by exercise before breakfast, little and light at first, and then gradually increasing its duration and amount as it can be borne. Their difficulty is dyspepsia, the cure of which remains to be discussed.

Nor should food be eaten within at least three hours before retiring. True, sleep sometimes promotes digestion, yet the latter interferes with sleep, "nature's great restorer." A full stomach is very apt to engender bad dreams, and induce restlessness and starting in sleep, of which nightmare is only an aggravated example. Especially should nuts, raisins, candies, fruit, etc., be eschewed at night. Eat little, if any, supper, and that three or more hours before retiring, and you will sleep the more sweetly, and feel the better the next day, because of the far greater good your sleep will do you. I for one feel best when I do not eat for six or eight hours before retiring, nor till I have been "up and doing" at least two hours. Yet in this case I would eat a hearty dinner.

But where three meals are eaten, seven, twelve, and five are undoubtedly the best hours; where only two, from eight to nine, and two to three are probably preferable. Business men who dine at three, should, by all means, forego forenoon luncheons and late suppers—in fact, all suppers, because the former unfit the stomach for dinner, and the latter, especially on the top of a hearty dinner, are doubly injurious. I recommend readers to breakfast about nine, and dine between two

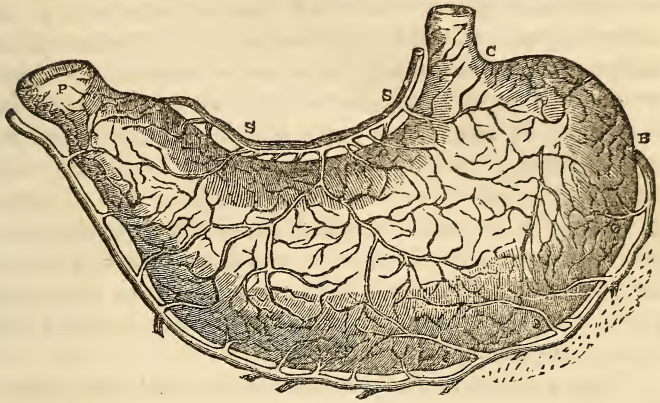
and three, and strenuously object to disturbing the digestive process after the latter hour. Even if, at first, you feel faint before retiring, sleep will abate hunger, so that you can endure two hours abstinence before breakfast with little inconvenience.

75. THE DIGESTIVE PROCESS

Is one of the most remarkable as well as important operations of the human economy. How soon the horse drops dead when his maw, or second stomach, is eaten through by the bott-worm. How suddenly cold water on an over-heated stomach suspends life by palsying this organ! How sudden and fearful the ravages of the cholera, which consist solely in disordered digestion! How rapidly children, taken down with the bowel complaint, fall away and die! Yet nothing but suspended digestion causes this leanness and death. How effectually impaired digestion, in the form of dyspepsia, frustrates both physical and mental energy! A vigorous stomach is indispensable to energy in any and every other portion of the system. Let us then examine this organ.

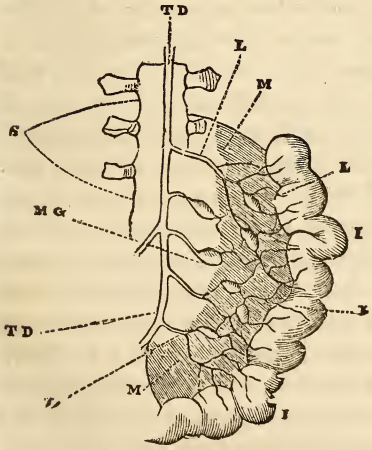
It consists of a sack [75] capable of holding from a quart to several gallons, according as it has been more or less distended by excess or deficiency of food and drink. Its upper side is much shorter than its under, thus appearing like a bag held horizontally, and ruffled on its upper edge [75]. It has two openings, the one where the food enters, located at its left superior side, and called the cardiac orifice [75], from its proximity to the heart, and the other, situated at the right superior side, named the pyloric orifice [75], through which the food, after having undergone the chymifying process, makes its egress into the duodenum, or second stomach. The latter opening is constructed with a valve, or door, so arranged as to close upon and send back whatever presents itself for egress not completely dissolved; and it departs from this rule in extreme cases only, and where things cannot be digested without remaining so long in the stomach as seriously to threaten its injury. Hence the ejection of food either way, undigested or much as it was eaten, is a sure index of a deranged stomach, because a vigorous one would first dissolve whatever is soluble.

76. STRUCTURE OF THE STOMACH AND INTESTINAL CANAL.



No. 8. THE STOMACH AND INTESTINAL CANAL.

C the cardiac orifice through which the food enters; P the pyloric orifice through which the chyme passes out; S S the coronal artery of the stomach. Another artery is seen passing under the stomach, and those lines seen to pass in all directions are ramifications of blood-vessels.



T D T D the chyle duct; L lacteals; M G mesentary glands, several of which are here represented; S spinal column. The folding structure of the intestines is here well represented.

No. 9. INTESTINES, LACTEALS, AND MESENTARY GLANDS.

(See page 147.)

It is composed of three membranes—the outer, called the peritonæum, or glossy coat, which lines and lubricates all the internal organs, and allows them to slide upon each other without friction; the middle coating composed of muscles laid transversely, and crossing each other in all directions, which contract upon its contents so as to give it the required motion; and the inner, or mucous membrane, which is extremely delicate, and of a pale cream color when healthy. And this structure pervades the whole intestinal canal. Nerves and blood-vessels also permeate all its parts; the latter imparting vitality, and the former relating it to the whole nervous system, by which means the various states of the stomach control both the nervous system and mind.

When a healthy stomach receives its food, this mucous membrane, or some glandular structure interwoven with it, empties into it a clear, tasteless liquid, resembling saliva in appearance, called the GASTRIC JUICE, previously secreted so as to be in readiness. This fluid is a most powerful solvent, capable of reducing to a milky, homogeneous mass, called chyme, all those heterogeneous substances taken as food. It, as it were, sets free, or extracts, from food the carbon, fibrine, casseine, nitrogen, hydrogen, and other substances, electricity also probably included, which enter into the composition of food, and are required to support life. It even dissolves food out of the stomach, but not as quickly as in. Its solvent power, when the stomach is healthy, is most astonishing. Not to dwell on the wonderful gastric powers of some animals—that East Indian bird which will swallow and digest even wood—man's solvent power is far greater, by nature, than any suppose. Some have swallowed knives, and digested their bone or horn handles. Is it not surprising that the stomach should bear up often a century under such continued abuse as even the most temperate daily heap upon it? Take our own cases. How long, how often, and how outrageously, reader, have you abused your own digestion by eating too fast, and too much, and of unwholesome food, and yet it perhaps retains much of its pristine vigor.

But such abuse ultimately weakens its solvent powers.

This allows food to lay so long in the stomach, that its heat induces souring or fermentation, which aids its dissolution, and helps to relieve the stomach of its load. But mark; this fermentation is nothing more nor less than incipient decomposition, or, to call it by its true name, the commencement of the ROTTING process. To ferment is to PUTREFY. Nor is it possible for food to sour in the stomach without engendering corruption. Especially is this true of the fermentation of meat. All know how vast the amount of putrefaction eliminated by its decay out of the stomach. Fermentation engenders the same in it. Is it then any wonder that dyspepsia, which consists simply in the rotting of food, especially meat, in the human stomach, should cause its victims to feel so wretchedly? Is not here a powerful argument against meat eating, especially when the stomach is not PERFECTLY good? Think of it; meat actually putrefying in the center of the system, to be sent all through it; literally frightful to contemplate! And yet this very process is perpetually going on, in a greater or less degree, within the stomachs of all in the least afflicted by dyspepsia, and this class embraces the mass of Americans, as we shall show when we come to treat of this disease. This chymical fact, that the souring process is incipient rotting, together with the fact that the food of the great mass of our nation does thus ferment, developes the prolific cause of most of those chronic, malignant, and all other diseases which bring suffering and premature death on the mass of mankind. Men cannot, therefore, guard too carefully against all injury of this important organ. Its healthy and vigorous condition is indispensable to life and happiness. Its abuse is suffering and death. As starvation, by withholding nutrition, soon destroys life, so imperfect digestion proportionably impairs it. Dyspepsia is partial starvation on the one hand, by withholding the materials of life, and death on the other, by engendering corruption. Hence, whatever dyspeptics do or leave undone, they should first restore the flagging energies of their stomachs. The scholar who is impairing digestion by study, instead of disciplining his mind, is undisciplining it in the most effectual manner possible, and by that very study which otherwise

would strengthen it, because stomachic diseases effectually prostrate the brain. Such should stop studying till they have effected a cure. And all, whoever they are, whose stomachs are strong, should make it their paramount business to keep them so, and if weak or disordered, to strengthen and heal them, and should give up or abstain from whatever impairs them. But more on this point hereafter.

This gastric juice acts mainly upon the OUTSIDE of the food eaten, thus evolving nourishment GRADUALLY—a provision of great practical utility. Otherwise we should be obliged to eat perpetually, which would be inconvenient, if not impossible.

77. THE MOTION OF THE STOMACH

Greatly facilitates digestion. That muscular coating of the stomach, already described, by contracting from all points upon the food, as it were CHURNS it till it is dissolved. As the muscles of the gizzard of fowls contract upon their food so powerfully as to grind it by friction against the gravel stones mixed up with it,* so the muscles of the human stomach keep perpetually squeezing and whirling the food over and over, always one way. This motion all must have observed within themselves. In cases of heart-burn, which is caused by the souring process[76], this rolling of the food is particularly observable in conjunction with the rising and burning caused by the inflammation of the stomach.

This motion is involuntary, else we should be obliged to WILL it continually, which would be exceedingly inconvenient, as it must be perpetual, so that we could do little else. Breathing also greatly facilitates it. Every inspiration hauls down the stomach to make room for the ingress of air, and every expiration redoubles this motion by allowing it to return to its place. And as breathing is perpetual, so is this stomachic motion. This physiological principle condemns in unqualified terms all lashing down of the stomach, and girting between it and the lungs, which prevents this motion. Unless it had

* Those who will bolt their food, like fowls, without chewing, should, like them, eat gravel stones to do the crushing teeth were created to accomplish.

been very important, nature would never have devised so effectual a means of securing it; and those who arrest it by tight lacing, do so at their PERIL.

Nature still further facilitates this motion by those ABDOMINAL MUSCLES which pass up and down across the stomach and bowels, so that we cannot well move the body backwards, forwards, sideways, any way, without using these muscles, and thus as it were kneading the stomach. This brings up for discussion

73. EXERCISE AFTER MEALS, AND NOONINGS.

Such exercise is generally condemned, and a nooning recommended instead; because two dogs fed alike, the one put upon the chase, the other allowed to rest, on being killed two hours and a half after feeding, in the former digestion was scarcely commenced, while in the other it was nearly completed. Violent exercise is undoubtedly injurious, because it robs the stomach of energy to supply the extra exactions of the muscles; yet this does not condemn moderate exercise. Nor are we told whether the still dog laid down all the time, or ran around leisurely here and there, but only that he was not on the chase; so that these cases fail of proving that we should "after dinner sit an hour." And since such sitting actually deprives the stomach of a part of that motion so indispensable to rapid and complete digestion, it is therefore positively INJURIOUS. Moderate exercise PROMOTES, instead of retarding digestion, though fatiguing labor is of course injurious.

"But," it is objected, "nature seeks rest after meals, and what she, unperverted, inclines us to do, is beneficial." But I doubt whether apathy after meals is natural. I even claim the converse. True, when we have overtasked the stomach, this organ withdraws energy from the muscles, brain, and wherever else it can obtain it, to enable it to discharge its burden, just as over-tasked muscles rob both stomach and brain, and an over-tasked brain robs all the rest of the system. Such robbery of organs not oppressed by those that are, is a physiological law of great practical utility. Nor is there a

more certain sign of having over-eaten, than subsequent lethargy of mind, or indolence of body. The stomatic nerve robs the brain, or muscles, when thus overloaded. One function was never made to interfere with or obstruct another, else nature would be at war with herself, which, let alone, she is not. On the other hand, all promote all. So far from its being a law of things that the stomach should retard the action of brain or muscle, it was created to facilitate both; so that RIGHT eating will actually exhilarate instead of prostrating all the other functions. I never take noonings. Children never do, but are generally more lively and playful after meals than before, but never more stupid; and he who cannot take hold of labor with increased zest and strength, or study with greater success, after having eaten than before, has eaten too much. Eat exactly right—enough but not too much, of the right kind, and masticate well—and you can labor with augmented ease, and apply your mind with increased clearness and power after eating, and feel like doing instead of loitering. Food, like sleep, naturally refreshes and invigorates; and unless it does so, is excessive in quantity or injurious in kind. This physiological law furnishes a sure criterion of the quantity of food required for the most perfect sustenance of body and mind. Yet when we have over-eaten, noonings and rest after meals are probably beneficial.

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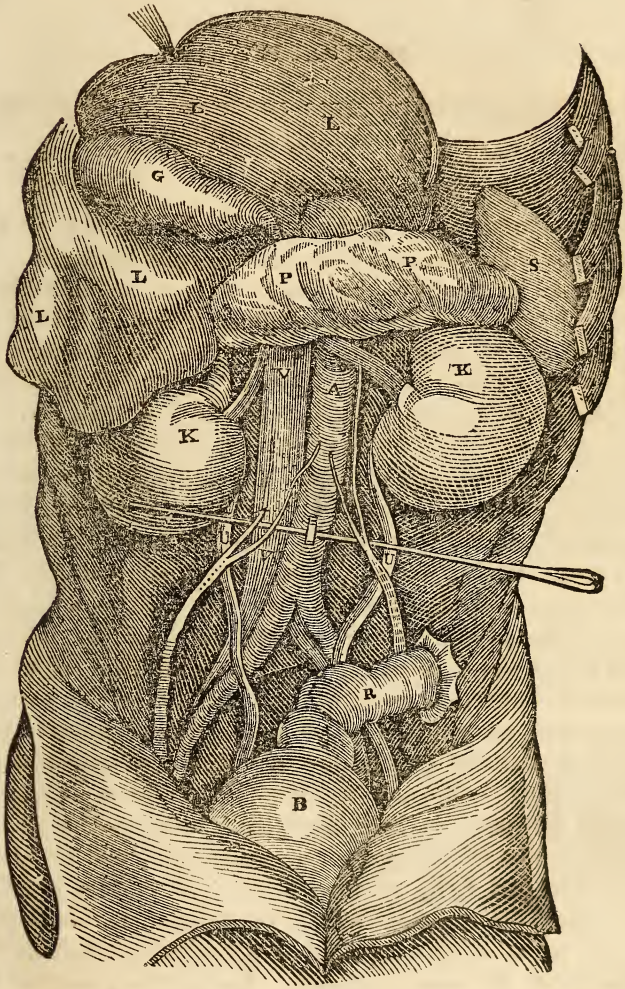
79. LOCATION AND FORM OF THE LIVER, GALL, PANCREAS AND KIDNEYS.



No. 10. THE LIVER, GALL, PANCREAS, AND KIDNEYS.

L the liver turned up to show its under side; G gall-bladder; P the pancreas; K the kidneys; S the spleen; A the descending aorta; V V the ascending vena cava which carries venous blood to the liver; R the rectum; B the bladder.

SECTION IV.

THE DUODENUM, LIVER, PANCREAS, INTESTINES AND MESSENTARY GLANDS, AND THEIR FUNCTIONS.

80. CHYLE.

The manufacture of good chyme by the stomach, so far from completing the digestive process, only begins it. It remains to be assorted—the nutritious from the innutritious portions; for there is a refuse residuum in food, as of ashes in combustion. By what means, then, is this separation effected?

After the chyme has been admitted through the pyloric orifice into the duodenum, or second stomach—a long narrow sack, composed, like the stomach proper, of the peritoneal, muscular, and mucous coatings—it there receives two secretions, one, called gall, from the liver,[79] and the other from the pancreas,[79] called the pancreatic juice. The gall is a liquid of a greenish color, and exceedingly bitter, secreted from the dark and venous blood while returning back to the heart, about eight pounds flowing through the liver per minute. This bile is composed mainly of carbon, and this is one of the means by which the system relieves itself of surplus carbon. Hence those whose livers are weak should eat substances less highly carbonized, so that they may have less carbon to secrete. They should also eat less food for the same reason. Animal food taxes the liver somewhat less than vegetable.

Soda is also secreted from the venous blood, and contained in the bile, and, being required in the vital process, is taken up by the liver, and returned into the circulation, to take part in respiration—a most ingenious contrivance for supplying the system with the soda it requires. The gall thus secreted by the liver, is emptied from all parts of this glandular and porous organ into little ducts, and these continue to empty themselves into larger and still larger ones, till they finally deposite the gall in a little sack called the gall-bladder,[75] from which it is carried by another duct into the duodenum.

With the glandular structure and general mechanism of the liver most readers are doubtless familiar.[75] If not, they can obtain the required knowledge by observing and dissecting that of animals.

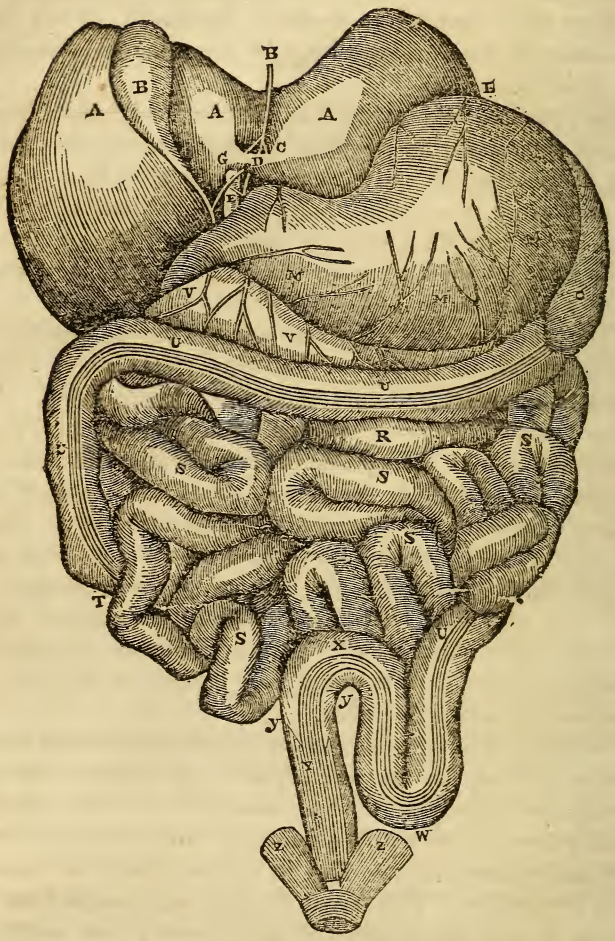
The pancreas, or sweet bread, another long and tapering gland situated right under the stomach,[75] secretes another fluid somewhat resembling the saliva, which is conveyed by a trough-like duct which traverses it,[75] into which a multitude of smaller ducts empty this fluid, into the duodenum. Of the precise nature of this juice little is known, only that it is indispensable to chylification, and this to nutrition.

These two fluids, commingling with the chyme, separate its nutritious from its innutritious portions, somewhat as runnet separates the whey and curd of milk from each other. The former is called chyle—a half-liquid grayish substance, closely resembling milk in appearance, laden with fibrine, carbon, nitrogen, oil, and other substances required to support life. In fact, its composition is almost identical with that of blood, and requires only contact with air to impart that red color and oxygen which constitute it blood proper. The importance of these two glandular secretions, shows how absolutely indispensable health of function in each is to human life, and the consequent evils of their abuse, and importance of their restoration—of which hereafter.

The chyle thus separated in the duodenum from the refuse portions of food, the two are urged along together into and through the intestines[75] by that muscular or middle coating which surrounds the entire alimentary canal, arranged circularly and transversely, so that its action crowds its contents along irresistibly. This canal is some six or eight times as long as its possessor is tall, and into it open a vast multitude of little mouths or suckers, called

81. THE LACTEAL VESSELS.[75]

These chyle-drinkers, passing through the three outer coatings, open upon the inner surface of the mucous membrane, these being in a great number of folds, by which the surface, and of course power of function, of this canal is greatly in-



No. 11. THE STRUCTURE OF THE INTESTINES.

A A A liver; B gall-bladder; M stomach; L cardiac orifice; V V pancreas; R S S S S small intestines; T termination of the small intestines, and commencement of the large one called the colon; T U the ascending colon; U U transverse colon, the seat of colicky pains; U W descending colon; X Y rectum.

creased. These lacteals suck up the chyle as it is thus urged along over them, and, passing backward behind the intestines, and then through innumerable little glands called the messentaries[75], empty themselves into larger, and these into still larger ducts, till they form one duct which passes up along inside the back-bone to near the neck, and empties its contents into the right subclavian vein, nearly under the right clavicle, or collar-bone, while the residuum, or waste portions of the food, are expelled along through the small intestines[75] into the ascending colon, which passes up on the right side of the abdomen, then into the transverse colon, which runs along under the stomach, and thence into the descending colon, which passes down the left side of the abdomen into the rectum[75], from which it is expelled in the form of excrement. Blood-vessels also open into the alimentary canal, and when inflamed, as in dysentery, cholera, etc., discharge blood; and hence the sudden weakening, and often death, they occasion.

Behold this most ingenious system of instrumentalities employed to manufacture food into blood, and load the blood with the elements requisite for sustaining life! Yet even now the digestive process is by no means complete—only, as it were, begun. After the materials of life have thus been furnished, they must be WORKED UP, else the human structure will be like the unused timber of a house or ship. How are these materials manufactured into life and happiness?

CHAPTER III.

CIRCULATION, RESPIRATION, PERSPIRATION, AND SLEEP.

SECTION. I.

THE HEART—ITS STRUCTURE AND OFFICE.

82. IMPORTANCE OF CIRCULATION.

THE chyle, thus richly freighted with these materials of life, is emptied into the blood[81]. With the looks and general nature of this porter of life, all are doubtless familiar. It is composed of two principal parts—serum, which rises to the top of fresh drawn blood when allowed to coagulate undisturbed, which also contains albumen, and globules, which settle to the bottom and coagulate. It also contains fibrine[51], which re-supply that waste of muscle and nerve consequent on their action[29]. The vivifying office of the blood and its essentiality to life, are too well known to require description. Drained of this messenger of life, how soon muscle, nerve, organ, faint and die?

But this blood must be CIRCULATED throughout the system in order to impart its vitality. Every organ, nerve, muscle, shred, and tissue of the entire physiology must be supplied with it perpetually or die. To secure this circulation, and also the requisite minuteness, nature has devised a circulatory apparatus of extraordinary power and efficiency, consisting of heart, arteries, capillaries, and veins.

83. THE HEART—ITS STRUCTURE AND OFFICE.

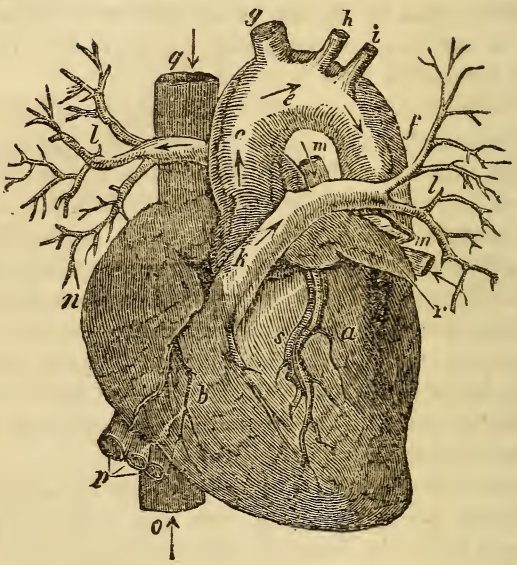
This organ is located at the top, and nearly in the middle of the chest, or between the shoulders, its apex pointing downwards and towards the left side, which, in common with the greater power of its left and lower portion, and greater proximity to the surface of the body, makes its beating more apparent further downwards and outwards than it really lays.

It consists, in common with the stomach, of three coatings—a peritoneal, a muscular, and a villous, serous, or mucous. Indeed, this treble structure appertains to arteries and veins as well as to stomach and intestines, and each coating serves a kindred purpose[76]. In the heart, however, this muscular coating is very large, so as to enable it to put forth the extraordinary contractile force required.

It is divided into four chambers—two above, called auricles, the contraction of which draws in the blood; and two called ventricles, which force it out. Nature has also divided it up and down, into right and left lobes, the right upper chamber, or right auricle, pumping in the blood by suction from the veins, and the right lower chamber, or right ventricle, forcing it out into the pulmonary or lung arteries and capillary structure, while the left upper chamber, called the left auricle, withdraws, on the principle of the suction pump, the blood from the lungs, and empties it into the left lower chamber, called the left ventricle, the contraction of which upon it forces it into the arteries and throughout the system.

This ever-acting organ contracts, in healthy adults, about seventy times per minute, or a little more than once per second, though slower or faster according to the general and temporary activity of the subject, often doubling this number, and forces out at each pulsation into both lungs and arteries somewhere from two to three ounces of blood, according to its size and power; so that as the blood weighs from twenty-five to thirty pounds, more or less, in different subjects, all the blood of the body passes through this organ and throughout the system about twenty-nine times per hour, or once in about two minutes. The heart, therefore, sends throughout the system nearly two hundred ounces every minute, or some seven hundred pints per hour, and above EIGHT TUNS every twenty-four hours. Think what tremendous power is required to withdraw from the veins, pump into the lungs, withdraw from the pulmonary veins, and then send round the system—thus handling these eight tuns four times over, equal to imparting motion to above THIRTY TUNS diurnally—these eight tuns of blood! And to impart so MUCH force as to send it

84. THE CIRCULATORY SYSTEM.



No. 12. THE HEART.

EXPLANATION.

a, the left ventricle; *b*, the right ventricle; *c e f*, the aorta, the great artery that goes off from the left ventricle; *g k i*, the arteries that are sent from the arch of the aorta; *k*, the pulmonary artery, that goes from the right ventricle to the lungs; *l l*, branches of the pulmonary artery, going to the two sides of the lungs; *m m*, the pulmonary veins, which bring the blood back from the lungs to the left side of the heart; *n*, the right auricle; *o*, the ascending vena cava; *q*, the descending: these two meet, and by their union form the right auricle; *p*, the veins from the liver, spleen, and bowels; *s*, the left coronary artery, one of the arteries which nourish the heart.

throbbing and rushing throughout the entire body, and into all those minute capillary vessels through which it passes! How little do we realize either the amount of power this organ puts forth or the good it effects!

To inspect still more closely this mighty pumping machine and its mode of action; the two upper chambers, or auricles, contract upon the blood they contain at the same time, thereby bracing and balancing each other. Their contraction produces a vacuum into which blood is again propelled by the contractile action of the veins, and the pressure of the atmosphere and muscles upon them. The two ventricles, or lower chambers, also contract together, thus also bracing each other, at the same time forcing the blood, the right into the lungs, (*l*) and the left into the arteries (*g*, *h*, *i*.) By this means time for rest is allowed the heart, the two auricles taking a short nap—and a very short one it is too—while the ventricles contract, and the latter going to sleep, and waking up again, while the auricles contract—thus all its parts getting tired, and taking rest as quickly and as often as the heart beats. The heart must have rest as much as the muscles and nerves. Yet if, like the muscles, it required six or seven hours of SUCCESSIVE sleep, death would inevitably supervene. Behold the simplicity yet efficiency of this arrangement for securing time to the heart to rest without suspending life!

We have said that the muscles, or walls of the heart, are thick, large, and strong. Some of its chambers, the ventricles, are much more so than the auricles, because they have more to do. The auricles have only to pump the blood in by suction from the veins and lungs, or rather to empty it out of themselves right into the ventricles, so that it may run in till it again fills them up and causes spontaneous contraction, while the ventricles have to pump it out, the right throughout the lungs, and the left throughout the body. The office of the ventricles being so much more laborious than that of the auricles, they are much the larger, and the left ventricle is by far the largest and strongest of all, because it has to force out the blood with sufficient impetus to drive it not only into all the extremities of the system but also throughout the incon-

ceivably minute blood-vessels of those extremities. The reader may comprehend and fix this circulatory process effectually in his mind by remembering—

1. That the right side of the heart, auricle and ventricle, have to do wholly with the dark or venous blood, and the left with arterial or red blood.

2. That the two auricles, or upper chambers, draw the blood into the heart and empty it into the two ventricles, or lower chambers which drive it—the right into the lungs, and the left throughout the system. Or thus:—

3. That the right upper chamber withdraws by suction the blood from the veins, and empties it into the right lower chamber, which, contracting upon it, forces it into the lungs, (*l*) while the left upper chamber, or auricle, withdraws it from the lungs and empties it into the left lower chamber, or ventricle, which propels it throughout the system.

I say "draws in." You ask HOW, as the blood is not a rope so that the further end cannot be pulled in by drawing in the other. How withdraws? Just as water is sucked up out of the well into the pump, and up that pump to that valve which carries it still higher. The heart is in every respect a self-acting forcing pump. As the working of the pump creates a vacuum into which the pressure of the atmosphere on the top of the well, which is sufficient to lift an unobstructed column thirty-two feet, forces the water till it is again full, so the contraction of the right auricle of the heart upon the blood it contains, forces out that blood into the right ventricle, and thus creates a vacuum into which the pressure of the atmosphere upon the surface of the body, and of course upon the veins, together with the contractile power of the veins, and the pressure of the muscles upon them, propel the blood along into these auricles. And just as the water in the pump above the valve is forced up and out, so the right ventricle pumps the blood into the lungs, to be withdrawn again from them by that same principle of suction just described. But for this external pressure of the atmosphere upon the veins, they would burst, strong as they are, and but for this internal pressure, the external would be sufficient to press the walls

of the veins so closely together as effectually to shut them up. If asked, why the contraction of the heart does not propel the blood both ways—BACKWARDS as well as forwards—the answer is, that it is constructed with valves, which close the instant the blood begins to go backwards, and thus stop its return. In and by its very attempt to return, it shuts the door in its own face. It must go FORWARDS, or stand still. Nature allows no back-water in any part of the circulating system.

We may next be expected to follow the blood through the arterial and capillary system, in the latter of which it expends its energies; but, preferring to follow the order of nature—to show whence the blood OBTAINS its freight—before we show where and how it deposits it, our subject brings us next to consider—

SECTION II.

THE LUNGS—THEIR STRUCTURE AND FUNCTIONS.

85. RESPIRATION AND ITS IMPORTANCE.

THE fibrine, carbon, oxygen, nitrogen, iron, and other substances which the blood derives from food, constitutes hardly half its freight. True, life cannot proceed without them; nor can it with them alone. We must eat; we must also BREATHE. And the elements furnished to the blood by breathing are even more, and more perpetually, indispensable to life than those derived from digestion, because we can live longer without the latter than the former. Starvation is terrible, and soon fatal, but suffocation is worse, and dispatches its victim a hundred-fold more quickly and certainly. Indeed, mankind can live but a few minutes—from five to eight—without breath; and those die the soonest when deprived of it who are the most active. Thus, the slow moulded Malay can stay under water from seven to eight minutes, and then rise, whereas the more active Caucasian suffocates if he remains under five or six minutes—the difference being one quarter in favor of the sluggish, and for this reason—the more ac-

tive the subject the more rapidly he consumes the energies derived from breath as well as from food, and therefore the more frequent and copious must be this re-supply. The faster we live, the more and oftener we must breathe. As the snake, frog, alligator, and other cold-blooded, sluggish animals, can live a long time without breath, especially while torpid, so the more stupid the human animal the less breath he requires. Hence, ability to hold the breath a great length of time is a poor recommendation.

Breathing thins the blood so that it circulates, and the reason why the absence of breath suffocates, is that it allows the blood to become too thick to circulate. Let the reader notice his own pulsations—their rapidity and power—when he breathes fully, compared with them when he holds his breath, and he will find them weaker and less frequent the longer he holds it, till it ceases to flow, soon after which life takes its exit.

Those whose circulation is not good—whose hands and feet are often cold, veins blue, and health none the best, will observe that inspiration gives a sudden start to pulsation, both hurrying it and increasing its power, but while they are expiring their breath, the heart beats both more slowly and feebly.

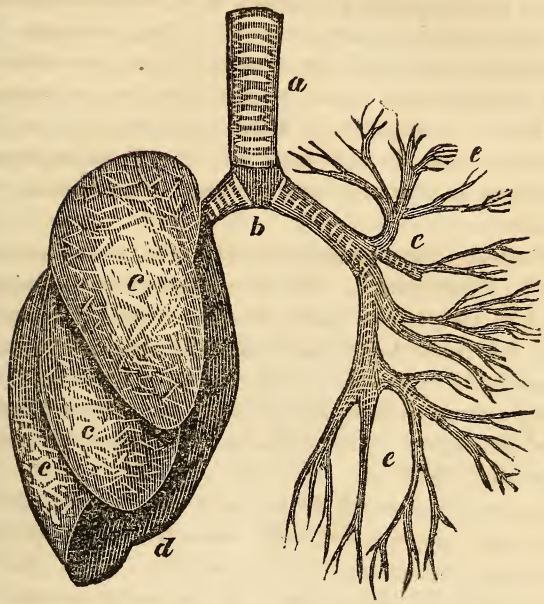
But why dwell upon the importance of respiration? All know how indispensable a constant supply of breath is to life. Nor can words compare with the experience of every reader in enforcing its importance.

But WHY important? What precise END in the vital process does breath subserve? What does it do for the blood and the animal? It thins the blood, but HOW, and WHAT FOR?

86. REQUISITION AND SUPPLY OF OXYGEN.

The vital process requires large and perpetually renewed quantities of OXYGEN. Without it, all the materials of life furnished by digestion would be of no avail. They are the timber and the tools of the vital process, while oxygen is the master workman—the grand motive power of the animal economy, indeed, of universal nature. The vital process

SHAPE AND STRUCTURE OF THE LUNGS.



No. 13.

EXPLANATION.

a, the trachea, or windpipe.
b, its branch to the right and left lung.
c c c, the three lobes which compose each lung.
e e e, the air cells of the lungs dissected.
d, the pulmonary arteries, or entrance and egress of the blood from and to the heart.

closely resembles combustion, of which oxygen is one great agent and instigator. As fire goes down with the scarcity of oxygen, and goes out with and in consequence of its disappearance, so the fire of life wanes in proportion as the supply of oxygen is diminished, and death supervenes almost immediately upon, and in consequence of its disappearance. It is this imperious demand of the system for oxygen which renders the requisition for breath so absolute, and its suspension so soon fatal. A demand for breath and oxygen thus imperious was not made in vain, but their office is as important as their demand is absolute, else it would be capricious. God never trifles.

Oxygen being thus essential to life, from what source is it obtained? From breath. Air always contains it—indeed, is composed of twenty-one parts of oxygen and seventy-eight nitrogen, the other hundreth being carbonic acid gas, and going to support vegetation. Air, wherever found and under all circumstances, is composed of these substances always in the same proportion. Any variation destroys it, or makes it into something else.

Adapted to this demand for oxygen, air abounds wherever man can go, unless artificially excluded. Being highly flexible, it can penetrate the least possible crevice, and even what we call solid substances. It not only surrounds the earth, extending some forty-two miles—probably many more—above it in all directions, but its great heaviness presses with immense weight upon every part of the surface of the body. Its quantity is, therefore, as illimitable as its demand is imperious. But, this oxygen being in the air, how is it introduced into the system?

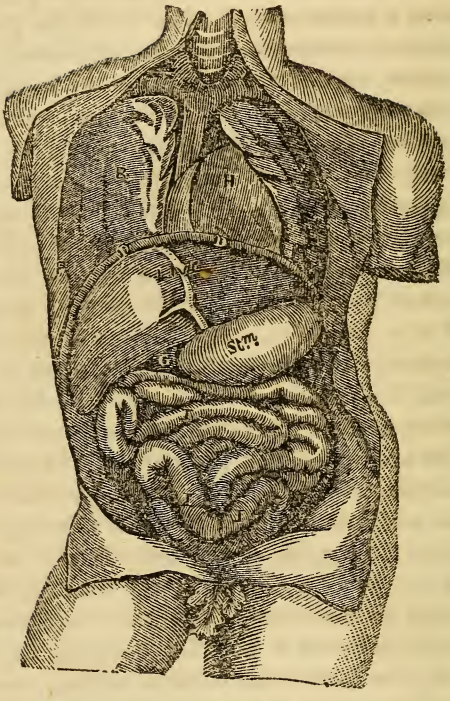
87. THE MEANS EMPLOYED TO INFLATE THE LUNGS

Are the production of a vacuum by means of the contraction of the diaphram, a thin, broad, and long muscle, located between the heart and lungs above, and the liver, stomach, pancreas, and abdominal organs below, attached across the back posteriorly, and to the abdominal muscles anteriorly, (as seen in *d d* of the engraving on the foregoing page,)

the contraction of which hauls down all the organs below it, thus producing a partial vacuum into which the great weight of the atmosphere, everywhere pressing into every accessible nook and corner, crowds the air nearest the mouth and nose and thus inflates the lungs. By an arrangement of muscles stationed between the ribs, called intercostal, the ribs are hauled up, and thus thrown outwardly, hence that heaving and swelling motion of the chest seen in breathing, so as to increase this cavity and allow a still greater influx of air. Air is neither stringy nor ropy, and cannot, therefore, be pulled or sucked into the lungs, for we have no means of getting hold of it to draw it in. All we care or need to do is to make that opening for it caused by hauling down the abdominal organs and heaving out the ribs. The air itself does the rest by running into the lungs spontaneously; or rather, the pressure of the atmosphere is so great as to crowd that portion of air next the mouth and nose into this partial vacuum created by the diaphram and intercostal muscles, the relaxing of which, and consequent letting up of the stomach and bowels, and letting down of the ribs, fills it up and thus expels the air, notwithstanding the resistance of that immense pressure of the atmosphere which forced it in. Yet the lungs do not empty out all the air, else they would collapse, as they sometimes do in crying children, so as to prevent inflation, the remedy of which is, to hold them up by the heels, head downwards.

88. STRUCTURE OF THE LUNGS.

The lungs are those two spongy lobes in the upper part of the chest which surround the heart, and together with the latter, fill up most of the cavity formed by the ribs. They consist of a very thin and light membrane, permeated by two sets of tubes, one set formed by the branching and re-branching almost to infinity, of the trachea, or wind-pipe, till their porous structure becomes too small to be traced with the eye, even when aided by the most powerful magnifying-glasses yet invented. The other set of tubes is formed by the branching and re-branching to the same degree of capillary minuteness of the pulmonary arteries and veins—those ducts



No. 14. The Lungs and Stomach

The letters R L and L L mark the right and left lungs, with the heart H lying between them, but chiefly on the left side. V is not a very accurate representation of the large blood-vessels going to the head, neck, and superior extremities. Liv^{r}. is the liver, lying in the abdomen, or belly, and separated from the chest by the arched fleshy partition D D, called the diaphragm, or midriff. The stomach appears on the other side, marked St*m*., but both it and the liver are removed a little from their natural situation. G is the gall-bladder. I I I are the various parts of the intestinal canal, through which the food is passed on its way from the stomach, by means of what is called the PERISTALTIC or VERMICULAR motion of the bowels, one circle of fibres narrowing after another, so as to propel its contents slowly but steadily, and resembling, in some degree, the condition of a common worm.

which convey the blood from the heart to the lungs and back again. Only a very thin, though tough membrane separates between these capillary air-cells and blood-cells, yet so minute are its ramifications, that an ordinary sized pair of lungs contain, or has folded up in them, a surface of about twenty thousand square inches! Nature is a great economist in everything, space included, and by this folding up of the membranes of the lungs it is, that she contrives to present so large an amount of surface in so small a compass—a contrivance akin to that by which she has folded up the intestinal canal [79], and still further folded its mucous surface so that a great amount of surface may be contained within a small compass. But for this folding arrangement, the size of the lungs must have been immense; just as, but for the similar folding structure of the intestines, mankind must have been six or eight times taller for the same weight than now.

The end attained by this plating structure is, that a large surface may be provided for the juxta-position of the air in in the air-cells, side by side with the blood in the blood-cells. The right lung is somewhat larger than the left, and the two envelope the heart so that this juxta-position may facilitate their combined functions.

We thus see in what manner the air, and of course the oxygen of the air, is brought alongside of the blood, only a thin membrane separating them. Yet this membrane, while it prevents the blood from escaping except when ruptured, does not intercept the passage of oxygen, a gas more subtle than the air itself, so that it can pass in through this membrane, while blood cannot pass out through it, nor air pass in through it to the body.

89. INTRODUCTION OF OXYGEN INTO THE CIRCULATION.

All this done, by what means is the oxygen induced, or coaxed through this membrane so as to unite with and vitalize the blood? But for some means of effecting this object, blood and air might lay side by side on a surface of twenty millions of inches instead of twenty thousand, and forever, instead of a few seconds, without the required passage of the

oxygen—this indispensable ingredient of life—from the air which it loves, and from which it is loth to part—even cannot part without destroying the nature of that air—into the blood. How then, is the blood oxygenated? As follows.

The globules of the blood contain iron so plentifully, that many of the French nobility are now wearing rings made from the iron extracted from the blood of their friends, for the same keepsake purpose for which we wear rings inclosing a lock of our friend's hair. Now, though the oxygen of the air loves its mate, nitrogen, right well, yet it loves iron better, so that when the oxygen contained in the air in the lungs is brought alongside of the iron contained in the blood of the lungs, the two, loving each other devotedly, rush into each others arms; but the blood being unable to pass through this membrane which separates them, while the oxygen is able to do so, the oxygen leaves its mated nitrogen, and elopes with the iron into the blood, changes that blood from its dark venous, to a bright red color, thins it, and inspirits it with life and action, so that it is now all prancing with vitality, eager to be sent throughout the system on its mission of life. We say the oxygen in the air rushes into the arms of the iron in the blood; and as the powerful Achilles having seized the beautiful Helen, carried her off from Troy, so the iron of the blood, having loaded itself with all the oxygen it can carry off, employs the heart as its coach-and-four, to transport its new bride through the arteries into the capillary system, there to deposite this instrumentality of heat.

That oxygen is thus transferred from the air in the lungs into the blood, is rendered certain by the fact that when air is inspired, it contains 21 per cent. of oxygen, while expired air contains only 12 per cent.; it having lost nine per cent. of its oxygen, but none of its nitrogen. Not till thus supplied with oxygen, is the blood COMPLETELY freighted with the materials of life. Though it had previously derived from food fibrine, bone, hydrogen, nitrogen, carbon, etc.[51], yet they were of no avail until it could add to its cargo this grand moving principle of the animal economy[56]. That oxygen thus obtained, goes frothing, and rushing, and bounding

on its life-imparting mission. What now takes place? How are these materials deposited? And what end do they, especially oxygen, subserve in the animal economy? The production of

90. ANIMAL HEAT.

To effectually and thoroughly HEAT UP the body and all its parts, is one of the first and most essential objects to be provided for. It so is, that a high temperature is indispensable to the vital process. Life, except in some of the lower, and cold-blooded species, cannot proceed except at a temperature far above that of surrounding objects. Though a snake may be frozen, so as to snap when bent like a pipe-stem and still live, yet man soon dies unless all parts of him are kept heated up to about 98° Fahrenheit—a temperature rarely reached by the atmosphere in the hottest climates in the hottest days in summer. And this temperature of the healthy human body is always about the same in summer and in winter; under the tropical sun of the torrid zone, and among "Greenland's icy mountains"; though in children it is a little higher, about 102° to 103°, and in the aged, a little lower than 98°; yet never varying, whoever or wherever the subjects, over five or six degrees above 98°, or two or three below it, without arresting life.

The far greater heat of the body than of surrounding objects, is a matter of perpetual observation by us, the coldness of stones, iron, ice, etc., furnishing samples. Even in summer this difference is great, as known by laying the hand on a corpse after it has become cold, that is, has sunk to the temperature of surrounding air and objects.

Of course the body, thus heated up so much above surrounding bodies, is constantly GIVING OFF caloric, in harmony with the universal tendency of heat to seek an equilibrium, just as a hot brick or iron between two cold ones naturally gives off its heat to the others, till all become equal in temperature. The amount of heat given off by the human subject every hour and minute is, therefore, very great, as experience proves it to be.

But the re-supply must be equally great, else a permanent cooling would take place, and of course death would supervene. And this re-supply must be furnished to all parts of the body. Nor merely to the outside, but internally as well as externally. Where does this re-supply take place? In the

91. CAPILLARY SYSTEM OF THE BLOOD-VESSELS.

Though the blood undoubtedly gives off some of its life materials in the arteries, thus promoting its circulation, yet it expends most of its renewing energy in the capillary network of the blood-vessels. That capillary or hair-fine structure which appertains to the lungs, has already been noted [83]. It appertains equally to the blood-vessels. The arteries which come off from the heart are large, but branch off, again and again, till they become too small to be followed with the naked eye. A powerful microscope enables us to follow them into ramifications still more minute. But all the optical aid yet devised, cannot trace them out to their almost infinitely minute ramifications—so minute and so perfectly ramified, that the point of the finest needle cannot be inserted, however carefully, into the flesh without puncturing some of them, besides all its displaces. In this capillary structure it is that the blood yields its vitality to the system. Yields WHAT? HOW yields? Its yield of those materials which form bone, muscle, nerve, organ, etc., is not now up for discussion. But the means by which nature re-supplies the required HEAT, and sustains the required temperature of the system being upon the tapis, how is it effected? By the mutual

92. COMBUSTION

Of the oxygen in the blood derived from the breath, with the carbon in the blood derived from food. Nowhere in nature is heat produced except by some form of combustion; nor need we regard animal heat as an exception. And the more so, since chymistry assures us that these two gases, carbon and oxygen, have a strong affinity for each other—the affinity of oxygen for carbon being even greater than of oxy-

gen for iron—so that when forced into close contact with each other, in this capillary system of the blood-vessels, they BURN EACH OTHER UP by creating spontaneous combustion, the result of course being heat, so that this system is heated up much as we heat a room. Wood—all that can be burnt —contains a large proportion of carbon, and hence its formation of charcoal, which is almost all carbon. Add a little fire to start with, and then blow a current of air upon the fire, and the oxygen of the air combining with the carbon of the wood produces combustion and evolves heat. But the carbon in the blood being unencumbered, free, and very abundant, and thus of the oxygen, there is no need of fire to start with. They burn without it. They burn each other up SPONTANEOUSLY. "It whissles ITSELF."[26] Thus is engendered that immense amount of animal heat within the system which re-supplies that given off by the cooling process just explained, and the body, together with all its parts, internal and external, kept at that elevated temperature necessary for the maintenance of life.

What next? As the combustion of wood forms smoke and ashes, so that of these two gases might be expected to deposite a like substance. And so far we find it does. And the ashes, or rather coals, of this internal combustion, chymically analyzed, are almost identical in their chymical compounds with charcoal, the residuum of burnt wood, both being composed mainly of

93. CARBONIC ACID—ITS FORMATION AND EXIT.

The blood, immediately on this combustion of its oxygen, which gives it its bright red color, assumes a dark, livid hue, resembling in kind the color of charcoal, though not as dark, because containing less carbon. Combustion can never take place, out of the system or in, without creating this acid; and that process of combustion just explained, by which the system is heated, forms some ten or twelve ounces of carbonic acid per day. This substance is hostile to life, and exceedingly poisonous, as seen when inhaled in a tight room in in which charcoal is consuming. Its superabundance is fatal

to life. Hence, unless some means were devised for transporting it from all parts of the system where this combustion creates it, those parts must die. How is the system cleared of this foe?

By the iron in the blood. That iron first made love, in the lungs, to the oxygen, also in the lungs, and wooed her to leave her husband, the nitrogen of the air, and run away with him, which she, faithless one, gladly seconded[89]. But no sooner has she been brought in close proximity, in the capillary blood-vessels, with the carbon also in the blood, than she finds another paramour in carbon, which she loves still better. Carbon reciprocates this love; when, jilting her iron paramour, she rushes into the arms of this charcoal paramour so ardently, that they consume each other, and die of excess of love, leaving only their burnt carcasses in the form of carbonic acid.

The iron of the blood thus left desolate—good enough for him—he runs away with oxygen, the wife of the nitrogen of the air, and carbon served him just right to run away with his stolen wife—by way of making the best of his desertion, proffers his hand to this carbonic acid, is accepted, concludes the union, and, being a great traveller, take his new bride along back with him by slow and leisurely movements to the lungs. This union, not being extra cordial, this carbonic acid finds in the nitrogen of the air in the lungs a much more agreeable companion than in the iron, and, quitting the iron, rushes through this gauze membrane of the lungs[88], combines with this nitrogen, and is brought out of its pent-up inclosure into the wide world, again to enter into the formation of vegetables and food.

Nor is the iron sorry on account of this desertion, because he has found a new supply of oxygen which he likes far better than carbonic acid. Or thus. The nitrogen in the air, and the iron in the blood mutually agree to SWAP WIVES, each liking the other's wife better than his own, and as these wives both love each other's husbands better than their own, they "jump at" the proposed exchange. This series of faithless desertions on the one hand, and of runaway-matches on

the other, accomplishes that grand system of heating up the system so comfortable in itself and so indispensable to life—a means as ingenious as the end attained is indispensable. By these means, the system guards itself against the otherwise fatal consequences of those sudden and extreme changes of the atmosphere from heat to cold—is prevented from freezing on the one hand, and from burning on the other, and always kept at the required temperature.

This shows us what the primary office of respiration is—the generation of ANIMAL HEAT. It also shows that one of the principal offices of digestion, is the subserviency of this same end—heat manufacturing.

Philosophical reader, you who love to trace out the relations of cause and effect, say whether these combinations, evolutions, and re-combinations are not beautiful in the highest possible degree. And do they not go far towards explaining the INSTRUMENTALITIES by which life takes place? This wonderful process, thus far considered an unfathomable mystery, the very attempt to solve which has been considered blasphemy, bids fair to be brought within the range of scientific investigation. That great philosopher Liebig has put us upon the track, and thus opened a new and most delightful field of philosophical research.*

94. THE AMOUNT OF HEAT

Thus generated, is given by Liebig as follows:—

"According to the experiments of Despretz, 1 oz. of carbon evolves, during its combustion, as much heat as would raise the temperature of 105 oz. of water at 32° to 167°, that is, by 135 degrees; in all, therefore, 105 times 135°=14207 degrees of heat. Consequently, the 13·9 oz. of carbon which are daily converted into carbonic acid in the body of an adult, evolve 13·9×14207°= 197477·3 degrees of heat. This amount of heat is sufficient to raise the temperature of 1 oz. of water by that number of degrees, or from 32° to 197509·3°; or to cause 136·8 lbs. of water at 32° to boil; or to heat 370 lbs. of water to 98·3° (the temperature of the human body;) or to convert into vapor 24 lbs. of water at 98·3°.

* See this whole process incontestibly proved and fully illustrated, in his Animal Chemistry.

"If we now assume that the quantity of water vaporized through the skin and lungs in 24 hours amounts to 48 oz. (3 lbs.,) then there will remain, after deducting the necessary amount of heat, 146380·4 degrees of heat, which are dissipated by radiation by heating the expired air, and in the excrementitious matters.

"In this calculation, no account has been taken of the heat evolved by the hydrogen of the food, during its conversion into water by oxydation within the body. But if we consider that the specific heat of the bones, of fat, and of the organs generally, is far less than that of water, and that consequently they require, in order to be heated to 98·3°, much less heat than an equal weight of water, no doubt can be entertained, that when all the concomitant circumstances are included in the calculation, the heat evolved in the process of combustion, to which the food is subjected in the body, is amply sufficient to explain the constant temperature of the body, as well as the evaporation from the skin and lungs."

This combustion of carbon and oxygen is not, however, the only source of animal heat. Food contains hydrogen which is also received into the blood. This hydrogen has also a strong affinity for oxygen, and combining with it, forms water. The author has seen—many readers have, doubtless, witnessed—the formation of water by the burning together, in a certain fixed proportion, of these two gases. A kindred junction takes place in all parts of the system, and this process both enhances the amount of animal heat, and creates the materials for perspiration, of which soon. This brings up for consideration

95. THE DUE REGULATION OF ANIMAL HEAT.

As the temperature of the atmosphere is exceedingly changeable, sometimes 105° Fahrenheit, and again 40° below 0; and, as the colder it is, the more rapidly this heat passes off from the body, some means must be contrived for manufacturing the more heat the colder it is; and the less the warmer, so as to keep the body just warm enough and none too warm. This is effected by a self-acting instrumentality as simple as it is efficient, as follows:—The colder it is, the more dense the atmosphere; that is, the greater the quantity of both oxygen and nitrogen it contains in any given bulk. Hence, supposing a male subject inhales at each respiration, about three pints of air, as is generally estimated, he of course inhales

a much greater amount of oxygen in cold weather than in warm, and the more the colder—just when he needs the more to keep him warm, but the less in summer when he gives off less heat. So that in and by the very changes of the atmosphere from warm to cold, is provision made for increasing the combustion of oxygen and the generation of heat within the system. The perfectly healthy subject, therefore, needs much less artificial or external fire in winter than is generally supposed, because nature has provided an increased supply of fuel in proportion to the increased demand. But we shall recur to this subject again when we come to treat of clothing.

96. SUMMER AND WINTER FOOD.

This principle of animal heat also shows why we require more food, and that more highly carbonized, in winter than in summer. As a given amount of oxygen, say the 1400 cubic inches per hour, estimated as consumed by a healthy adult—though this amount varies more than half in different subjects, accordingly as their lungs are larger or smaller, active or sluggish, so that all such estimates are of little worth—can burn up only its equivalent, that is, a fixed proportion of carbon, and as this supply of oxygen is much greater the colder the weather, of course the corresponding re-supply of carbon to be derived from food must be proportionally increased. And so it is. Appetite is almost always greater in cold weather, than in warm. And also appetite for more highly carbonized kinds of food. Thus the fat of meat which consists of 79 per cent., or nearly four-fifths carbon, relishes much better in winter than in summer. So do butter, honey, various oils, nuts, and the like. Hence the Esquimaux can drink down gallons of train-oil, and eat from ten to fifty pounds of meat per day, or fourteen pounds of candles at a meal, without injury [65]; indeed, cannot live without an immense consumption of carbon. The great condensation of the air consequent on extreme cold, allows him to inhale proportionate quantities of oxygen, to burn up which, he must have this great supply of carbon. We should, therefore, eat more in cold weather than in warm, and food richer in carbon.

This brings up our unfinished argument about

97. MEAT IN WINTER.

The advocates of a flesh diet claim that meat is indispensable, at least in winter, to supply this increased demand for carbon. The premises are granted that we need more carbon, and of course food more highly charged with carbon, in winter than in summer. Yet their argument is completely overthrown by the fact that vegetable food contains, in the aggregate, as much carbon as animal. Thus roasted flesh contains only 52 per cent. of carbon, while eggs contain 53, and bees-wax 81. This shows why some relish bees-wax, namely, for its carbon. The albumen of wheat contains 55 per cent. and of almonds 57 of carbon. Starch contains 44 per cent., and the amount of carbon contained in four pounds of starch equals that contained in thirteen pounds of meat. Indian corn contains a great amount of carbon, so does molasses. In fact, abstract the water from molasses, and the remainder is carbon; so that molasses and Indian meal furnish an excellent winter diet. So do bread and molasses. All vegetable oils are composed of about four-fifths of carbon, and as drop after drop of this oil can be pressed out of a walnut, or butternut, of course these nuts furnish a far greater proportion of carbon than lean meat. Why not, then, seek in nuts and vegetable oils the carbon, to obtain which you say we must eat meat? That is, why not eat nuts in place of meat? Chesnuts should be boiled, and other nuts well cured, yet they were undoubtedly created to subserve the purposes of food, and should form a part of our regular winter meals. Nor are nuts inferior to butter as a relish with bread. Sugar, and sweets generally, contain from 40 to 45 per cent. of carbon, according to how dry or wet they are, the balance being water. Hence, also, as their water is easily taken up by the stomach, they may justly be considered as nearly all carbon. Hence, as fat is nearly all carbon, all the slaves, animals, and even dogs on the sugar plantations, become fat while making sugar. That is, almost the entire solid matter of sweets, when their water is dried out, is carbon. Nearly the whole of honey, after its

water has been abstracted, is carbon. Olives, and olive-oil also contain it, especially the latter, in far greater proportion than meat. We do not, therefore, need to go to the animal kingdom for carbon, when we can obtain it, in forms much more concentrated, from the vegetable. True, we can obtain it from meat, especially fat meat, yet this very fat is a state of disease, caused by a superabundance of carbon; whereas, health requires fixed proportions of oxygen to burn it up. To fatten well, animals must be lazy; and does not this excessive stuffing on the one hand, and deficient exercise on the other, engender disease? Yet in vegetables we obtain all the carbon we require without any of the evils of meat-eating [37 to 49]. Then why seek that carbon in diseased flesh—flesh cannot become fat but by becoming diseased—which we can obtain from vegetable diet in greater abundance, and in a healthy state?

The sufficiency of vegetables for winter food is still farther established by the fact that horses, cattle, and even reindeer—all graminivora—are kept abundantly warm by their natural diet, though they inhabit regions quite as cold as any of the carnivora. Indeed the latter are more abundant, relatively, in the torrid zone—a fact which tears this winter meat-eating argument in tatters. If meat is so conducive to animal heat and life, why are lions, tigers, etc., confined to warm climates? As oats keep the horse abundantly warm, why not oatmeal keep man warm enough in winter? Ask the Highland Scotch from time immemorial, if their oat-meal cakes and gruel have not kept them warm enough to camp out even in winter, with snow for their pillow and blanket. Thus is this meat-eating argument completely routed in every aspect.

But the great trouble of civilized life, is, not to get carbon enough, but to get LITTLE enough. This is especially true of the sedentary. They breathe but little, because they exercise little, and because they live mostly in heated rooms, where the air is both rarefied and vitiated. Hence they take in but little oxygen, and therefore require but little carbon to burn it up. Yet such eat, and keep eating, as heartily as out-door laborers, and often more so; thus taking in great quantities of

carbon while they consume but little. Hence their dyspeptic and other difficulties. No; few, if any, require more carbon than they now obtain, even in winter; whereas ninety-nine in every hundred would be benefitted by lessening the quantity one half, especially in summer. Its superabundance is the great cause of disease, of which fasting, less highly carbonized food and more oxygen, are the remedies. All who feel better when cold weather sets in, superabound in carbon, and by taking less of it in food would be cured by the cold. But that very cold which brings their relief sharpens up appetite, and they take still more carbon; thus keeping up both its superabundance and their disease; whereas, if they would not increase such quantity, meanwhile breathing freely so as to burn up its surplus, they would obtain permanent health. And such, in fact all, to be healthy, MUST diminish the quantity of carbon taken in food in spring, compared with winter. The great cause of the prevalence of diseases in the spring, is to be found in our eating as much carbon then as in winter; whereas we burn out, and therefore require, far less. And one of the great instrumentalities of health is to be found in graduating the amount of carbon received from food in proportion to that of oxygen inspired from breath. But as the principle here involved that we should take less food, and that less highly carbonated in warm weather, and when sitting by the fire in cold, than when abroad in cold weather, is before the reader, and as we shall in due time develope that fundamental condition of health—BALANCE—we dismiss this subject of animal heat for the kindred one of the

98. REQUISITION OF FRESH AIR, ESPECIALLY FOR CHILDREN

Oxygen being indispensable to life[86], and being derived mainly from the air[89], the necessity for constant and copious re-supplies of fresh and well oxygenated air becomes obvious. And to this, the perpetual experience of every human being bears ample testimony. How dull and stupid we all feel after sitting a while in a hot room, especially if heated by an air-tight stove—an article I would never sit by if I could help it, because while it rarefies the air so that we can breathe but

little oxygen even if the air were fresh, it prevents its circulation in the room, so that we soon breathe out most that remains. Hence the accompanying stagnation of the blood, and lethargy of body and mind. But start out into the fresh air, and how differently you feel! How lively your body! How brisk all your feelings! How clear the mind! How happy the whole man! Every human being ought to spend several hours every day, cold or warm, in the open air, coupled with much bodily activity. Four hours of out-door breathing daily, is the least time compatible with health for adults, though ten are better; while children require a greater amount both of out-door air and exercise, because they have, or ought to have a higher temperature [90], and greater vigor in the circulation, because that circulation has more to do in them than in adults—has to BUILD up as well as sustain the system. This shutting children up in the house, even in cold weather, this being so afraid of a little fresh, cool air, is consummate folly—is downright murder; for there is no numbering the deaths this extra carefulness has occasioned. Why, cool air is not poisonous. It is healthy—more so than warm air; because, for its bulk, it contains more oxygen [95], that great quickener of the blood, and stimulator of muscular, nervous, and cerebral action. If a heated atmosphere had been best for man, nature would have provided it. But it is not so. It relaxes. All the inhabitants of the tropics are indolent, mentally and physically. All northerners, however active here, are rendered indolent in a tropical climate. Hence the requisition of more or less cold to stir up the system. And unless parents wish to make inert blockheads of their children, do not keep them shut up in a hot stove room. However cold it is, let them out—for all children delight to go—and their lungs will soon warm them up and keep them warm [95]. And if your dear, darling, delicate, puny child is indeed so weak, that fresh air gives it a cold, you ought to be sent to prison for rendering it thus tender—rather, ought not to have any child at all. This brings up for condemnation—

99. THE VITIATED ATMOSPHERE OF SCHOOL-ROOMS.

Schools are great disease-breeders to both body and mind. Children require action, not confinement. They should learn on foot, not "sit on a bench and say A." Especially should they have an abundance of fresh air. Yet to confine two or three score of children in a school-house sixteen by twenty—enough to breathe up all the air it contains in a few minutes—and to burn out the vitality of even this moiety by a roaring fire—and then to keep them thus, stuffed with food, but panting for breath and action, ONE QUARTER OF THEIR LIVES, and most of the balance not much better, signs, seals, and delivers the death-warrant of many a fond and lovely embryo of humanity. Our children do not get half air enough. This occasions their being puny, sickly, and mortal. No wonder that half of them die in childhood. The wonder is that more do not.

Nor are cities the places to bring up children. They cannot go out of doors for fear of getting lost or run over, nor play within, because ma, grandma, or aunt is sick. Nor if they could, can they obtain fresh air in coal-heated nurseries or kitchens. God made the country—man made the city. Cities are useful only to heap up paltry gold. The country, "O that's the place for me." But, parents, whether you inhabit city or country, see to it, I beseech you, that your children have a full supply of FRESH AIR DAILY AND PERPETUALLY.

Our subject also shows the absolute necessity of

100. VENTILATION IN GENERAL,

To say nothing of the importance of ventilating churches, lecture-rooms, and places of general concourse. Hear A. Combe on this subject.

"The fatal effects of breathing highly vitiated air may easily be made the subject of experiment. When a mouse is confined in a large and tight glass-jar full of air, it seems for a short time to experience no inconvenience; but in proportion as the consumption of oxygen and the exhalation of carbonic acid proceed, it begins to show symptoms of uneasiness, and to pant in its breathing, as if struggling for air; and in a few hours it dies, convulsed exactly as if drowned or stran-

gulated. The same results follow the deprivation of air in man and in all animated beings; and in hanging, death results not from dislocation of the neck, as is often supposed, but simply because the interruption of the breathing prevents the necessary changes from taking place in the constitution of the blood.

"The horrible fate of the 146 Englishmen who were shut up in the Black Hole of Calcutta, in 1756, is strikingly illustrative of the destructive consequences of an inadequate supply of air. The whole of them were thrust into a confined place, eighteen feet square. There were only two very small windows by which air could be admitted, and as both of these were on the same side, ventilation was utterly impossible. Scarcely was the door shut upon the prisoners, when their sufferings commenced, and in a short time a delirious and mortal struggle ensued to get near the windows. Within four hours, those who survived lay in the silence of apoplectic stupor; and at the end of six hours, NINETY-SIX were relieved by death! In the morning, when the doors were opened, twenty-three only were found alive, many of whom were subsequently cut off by putrid fever, caused by the dreadful effluvia and corruption of the air.

"But, it may be said, such a catastrophe as the above could happen only among a barbarous and ignorant people. One would think so; and yet such is the ignorance prevailing among ourselves, that more than one parallel to it can be pointed out even in our own history. Of two instances to which I allude, one has lately been published in the 'Life of Crabbe,' the poet. When ten or eleven years of age, Crabbe was sent to a school at Bungay. 'Soon after his arrival, he had a very narrow escape. He and several of his school-fellows were punished for playing at soldiers, by being put into a large dog-kennel, known by the terrible name of the 'Black Hole;' George was the first that entered, and the place being crammed full with offenders, the atmosphere soon became pestilentially close. The poor boy in vain shrieked that he was about to be suffocated. At last, in despair, he bit the lad next to him violently in the hand; 'Crabbe is dying, Crabbe is dying,' roared the sufferer; and the sentinel at length opened the door, and allowed the boys to rush out into the air. My father said, 'A minute more and I must have died.''—*(Crabbe's Life, by his Son.)*

"The other instance is recorded in Walpole's Letters, and is the more memorable, because it was the pure result of brutal ignorance, and not at all of cruelty or design. 'There has been lately,' says Walpole, 'the most shocking scene of murder imaginable: a parcel of DRUNKEN constables took it into their heads to put the laws in execution against DISORDERLY persons, and so took up every person they met, till they had collected five or six and twenty, all of whom they thrust into St. Martin's round-house, where they kept them all night with doors and windows closed. The poor creatures, who could not stir or breathe, screamed as long as they had any breath left, begging at least for water; one poor wretch said she was worth eighteen pence, and would gladly give it for a draught of water, but

in vain! So well did they keep them there, that in the morning four were found stifled to death; two died soon after, and a dozen more are in a shocking way. In short, it is horrid to think what the poor creatures suffered; several of them were beggars, who, from having no lodging, were necessarily found on the street, and others honest laboring-women.' * * * * * * *

"I do not mean to say, that in all the above instances the fatal results were attributable exclusively to vitiation of the air by breathing. Fixed air may have been disengaged also from some other source; but the deteriorating influence of respiration, where no ventilation is possible, cannot be doubted. According to Dr. Bostock's estimate, an average sized man consumes about 45,000 cubic inches of oxygen, and gives out about 40,000 of carbonic acid in twenty-four hours, or 18,750 of oxygen, and 16,666 of carbonic acid in ten hours, which is nearly the time during which the sufferers had remained in the cabin before they were found. As they were two in number, the quantity of oxygen which would have been required for their consumption was equal to 37,500 cubic inches, while the carbonic acid given out would amount to upwards of 32,000 inches—a source of impurity which, added to the constant exhalation of waste matter and animal effluvia from the lungs, was manifestly quite equal to the production of the serious consequences which ensued from it, and which no one, properly acquainted with the conditions essential to healthy respiration, would ever have willingly encountered. Even supposing that the cause of death was some disengagement of gas within the vessel, it is still certain that, had the means of ventilation been adequately provided, this gas would have been so much diluted, and so quickly dispersed, that it would have been comparatively innocuous.

"The best and most experienced medical officers of the army and navy, are always the most earnest in insisting on thorough ventilation as a chief preservative of health, and as indispensable for the recovery of the sick. Sir George Ballingall recurs to it frequently, and shows the importance attached to it by Sir John Pringle, Dr. Jackson, Sir Gilbert Blane, and others of equally high authority. Sir John Pringle speaks of hospitals being, in his day, the causes of much sickness, and of frequent deaths, 'on account of the bad air, and other inconveniences attending them;' and Dr. Jackson, in insisting on 'height of roof as a property of great importance in a house appropriated to the reception of the sick of armies,' adds as the reason, that 'the air being contaminated by the breathings of a crowd of people in a confined space, disease is originated, and mortality is multiplied to an extraordinary extent. It was often proved in the history of the late war, that MORE HUMAN LIFE WAS DESTROYED BY ACCUMULATING SICK MEN IN LOW AND ILL VENTILATED APARTMENTS, THAN BY LEAVING THEM EXPOSED, IN SEVERE AND INCLEMENT WEATHER, AT THE SIDE OF A HEDGE OR COMMON DIKE.'

"In the same volume (p. 114) the reader will find another example not less painful than instructive of the evils arising, first, from

crowding together a greater number of human beings than the air of the apartment can sustain, and, secondly, from the total neglect of scientific rules in effecting ventilation. In the summer of 1811, a low typhoid fever broke out in the 4th battalion of the Royals, then quartered in Stirling Castle. In many instances, violent inflammation of the lungs supervened, and the result of the two diseases was generally fatal. On investigating the circumstances of this fever, it was found that rooms of twenty-one feet by eighteen were occupied by SIXTY men, and that others of thirty-one feet by twenty-one were occupied by SEVENTY-TWO men! To prevent suffocation the windows were kept open all night, so that the men were exposed at once to strong currents of cold air, and to 'the heated and concentrated animal effluvia necessarily existing in such crowded apartments; thus subjecting them to the combined effects of typhus fever, and of pneumonic inflammation. In the less crowded apartments of the same barrack no instances of fever occurred.' The men who were directly in the way of the current of cold air, were of course those who suffered from inflammation.

"Mr. Carmichael justly regards impure air as one of the most powerful causes of scrofula, and accounts for the extreme prevalence of the disease in the Dublin House of Industry at the time he wrote, (1809,) by mentioning, that in one ward of moderate height, sixty feet by eighteen, there were THIRTY-EIGHT beds, each containing THREE children, or more than one hundred in all! The matron told Mr. Carmichael, that 'there is no enduring the air of this apartment when the doors are first thrown open in the morning; and that it is in vain to raise any of the windows, as those children who happened to be inconvenienced by the cold, close them as soon as they have an opportunity. The air they breathe in the day is little better: many are confined to the apartments they sleep in, or crowded to the number of several hundreds in the school-room.' Can any one read this account, and wonder at the prevalence of scrofula under such circumstances!"

101. THE DUE VENTILATION OF SLEEPING APARTMENTS.

Is still more important, because we consume quite as great a proportion of air, yet are far more liable to neglect its resupply. Most of us spend ONE THIRD OF OUR LIVES in little, eight by ten bed-rooms, scarcely seven feet high, and capable of holding only from five to eight hundred feet of air—not an hour's breathing timber! And then every crevice, even to the key-hole, must be stuffed to prevent the ingress of fresh air. Look at our factory operatives—often six persons confined all night in a little room not exceeding ten feet square, and seven high! No wonder their vocation is unhealthy. And then how repulsive the smell of bed-rooms generally in

the morning, observable on quitting them a few minutes, and returning. Instead of being thus miserably supplied with fresh air, they should be large, and especially high, and arranged so as to admit free ventilation. A draft directly upon you may be objectionable, yet even this is far less so than confined air, and can be rendered harmless by a good supply of bed-clothes—though the less of these, and keep comfortable, the better. Large, airy sleeping apartments would add one fourth to the aggregate duration of human life. They should be the largest rooms in our houses.

Yet the general idea obtains that night air is unwholesome, and often pestilential, than which nothing is more unfounded. The Deity render night air unwholesome, and yet compel us to breathe it! This supposition conflicts with the whole economy of nature. If night air had been really injurious, she would have allowed us to sleep without breathing, for she never compels the least thing injurious. Night air is equally as wholesome as day air. It may be damper, but that does not hurt it for breathing purposes. It is usually cooler, and, therefore, contains more oxygen, and is, therefore, even better than day air—at least for sleeping purposes. Why are we so restless in hot summer nights, and why sleep so sweetly, and wake up so invigorated in cold fall nights, but because the needed supply of oxygen is so much greater in the latter instance? So far from being injurious, I give it as my deliberate opinion, that sleeping with open windows would greatly promote health. I prefer to do so, however stormy or boisterous the weather, and know of several who sleep thus summer and winter, every one of whom is remarkably robust and healthy. Yet if you adopt this practice, adopt it by degrees, so as not to take cold. Special attention is invited to

102. BLUE VEINS, A SIGN OF INSUFFICIENT BREATHING.

The blood is rendered dark by the carbon it has taken up. And the darker it is, the greater the amount of carbon in it. Now this carbon should pass off through the lungs, and it will do so when we breathe abundantly. But when we do not, a sufficient amount of the nitrogen contained in the air

we breathe is not brought alongside of the carbonic acid contained in the blood to carry off all of the latter, so that it is obliged to return with the blood into the system, and, being a rank poison as well as stagnating, it poisons and prostrates the vital organs, diminishes life, and engenders disease. Blueness of veins in children or adults is a sure index of the superabundance of this poison and of insufficient breathing. Let such both eat less and breathe more, so as to thin and redden the blood. True, the blood in the veins should be dark, but not dark enough to show through. And when visible, see to it, as you value life, that this powerful disease-breeder is removed by a more thorough oxydization of the blood.

An entire volume might be written on this subject of ventilation; but all-important as it is, our proposed limits do not allow its farther prosecution. We say in conclusion, attend to breathing even more than to eating. Make provision for a constant re-supply of fresh air even more than for good food. And ye parents, see that your children have it in luxurious abundance night and day.

SECTION III.

PERSPIRATION, OR THE STRUCTURE, FUNCTIONS, AND CLEANSING OF THE SKIN.

103. WATER ESSENTIAL TO LIFE.

WATER covers a great part of the earth's surface, and constitutes a large proportion of all that lives. Nor can anything grow without it, nor, mosses excepted, any dry thing live. The ancients supposed it the parent of all endowed with life, and experience teaches us that without it plant and animal parch up and die.

Nor can man live without it. Indeed three-fourths of him are composed of water, and so are four-fifths of his blood. Whether this element is required on its own account, or as the great PORTER of the system, we will not now stop to en

quire; but, be its use what it may, it is even as essential to life as solid food, nor is anything but air more so.

If asked—"How, then, could Dr. Alcott live over a year without drinking a drop of liquid, and others a less time, and even without experiencing thirst?" I answer—All we eat contains it. Meat consists of about three-fourths water; carrots, beets, turnips, potatoes, and cabbages, about nine-tenths; eggs about seven-tenths; milk nearly nine-tenths; and thus of other kinds of food. So that we cannot eat without introducing it into the animal economy.

Man was also undoubtedly ordained to drink as well as eat. To this end he has a drinking organ—Bibativeness, or Aquativeness—located anteriorly to Alimentiveness, adapting him both to the existence of water and this constitutional demand for drink. Water is also manufactured throughout every portion of the system[95]. Whether we drink water or not, whether it abounds in the system, or is deficient, we are obliged to receive hydrogen into the system with our food, and oxygen through our lungs, so that these two gases are forced into close proximity in the capillary blood-vessels, and whenever thus brought together, they unite in the proportion to form water till one or the other is consumed[94]. So that, with all this demand for water, man could probably exist without taking any water even with his food.

104. PERSPIRATION.

But all the water thus taken into and manufactured within the system does not remain there. Indeed, it is perpetually given off through the lungs, the skin, and every avenue of escape throughout the body. The amount given off by a healthy adult daily is estimated at about forty ounces, though it of course varies in different individuals, and in the same individual at different times, according as he drinks, exercises, and the like, much or little.

The lungs exhale large quantities of water, as seen in breathing upon glass, and its freezing on the beard in a cold morning. The moisture expired with the breath in a crowded room also occasions that "sweating" of the windows so often

observed. But the great outlet for the escape of water, after it has fulfilled its mission of life, is

105. THE SKIN AND ITS STRUCTURE.

This thin and exceedingly tough membrane is stretched over the entire body, and also lines all its apertures. It consists of three coatings—the cuticle, or epidermis, a horny, insensible over coat, such as we see often rubbed up by bruises, and raised in blisters. This outside skin is thin over the joints so as not to obstruct their motion, but thick in the palms of the hands and soles of the feet, even from birth—a wise provision indeed. The second coating, called rete mucosum, constitutes the middle coating, and contains that coloring matter which paints the various races their various colors—the African, black, for example. The cutis, dermis, or true skin, is the great instrumentality of sensation, absorption, and exhalation, the former of which will be treated in its place.

This cutis is perfectly full of little pores, thousands being contained in every square inch. It is also filled with two sets of capillary network, nerves, and blood-vessels, the latter being especially numerous here so as to support the former, and thus create sensation. Indeed, it is probably composed mainly by these tissues, and its innumerable pores are probably formed by their interweaving. Through these pores the waste water, and much of the excrementitious matter engendered during the vital process, escapes, causing the perspiration to be sensible or insensible according as it is more or less copious Sensible perspiration causes sweat to ooze out and stand in drops, or run down in streams, from all parts of the body, as when we take violent exercise in hot weather, drink copiously of warm water, and the like.

106. INSENSIBLE PERSPIRATION, AND ITS IMPORTANCE.

This is perpetually taking place from all parts of the skin. This is rendered plainly perceptible by inserting the hand in a glass tumbler turned bottom upwards, or by laying the hand on glass, or even drawing the finger slowly across it.

A contrivance as deeply laid as this, cannot but perform

some most important end in the animal economy. And so it does. These forty ounces of water do not steam forth perpetually from the system alone, but bring along out with them much of the waste matter engendered by the vital process. This process is one of perpetual WASTE. It is estimated that all the matter in the system, at any given time, becomes useless, because its vitality is "used up," is carried off, and its place re-supplied by foreign substances every seven years. Probably half that time would be nearer the fact. Of course if this matter were allowed to remain just where it is created, the system would soon become as filthy as the Augean stables. To prevent this it is carried off as fast as it is manufactured.

How carried off? By that same porter which brought it—WATER. As the blood brings a load of oxygen, and, as soon as it is unloaded, takes on the carbonic acid created by the combustion of that oxygen [93], so after the water in the blood has brought out and deposited its freight of fresh muscle, nerve, etc., it takes on another freight of waste matter, and issues forth out of the system in the form of steam.

What the author says, he generally knows—rarely guessing or theorizing. Ye allow a single departure. But for some such expulsive principle, the water, too, would lay inert in the system. FORCE is necessary to expel it, and doubly so to expel its accompanying corruption. Now may not this force be imparted by that very process which both manufactures the water [94] and converts it into steam? In other words, does not this conversion of water into steam, which necessarily manufactures force, create the force required to expel both the water and its freight?

But be the means of such egress what it may, out it comes, and drags along out with it MORE THAN HALF of the refuse of all we eat, drink, and take into the system. Though the kidneys, bowels, and lungs help to evacuate this waste matter, yet the skin is the great sluice-way for the egress of excrementitious matter—the scavenger of life which collects up all the leavings and filth out of the highways and byways of the city of life, and empties them out through this gateway. This shows the

107. IMPORTANCE OF KEEPING THE PORES OF THE SKIN OPEN.

These pores closed, this waste matter is shut within the system to clog the organs of life on the one hand, and breed disease in the system on the other; for, be it remembered, that most of this waste matter, like carbonic acid[93], is POISONOUS as well as in the way. It MUST PASS OUT, or it extinguishes life. And woe to that system which retains it within its borders! A. Combe ably enforces this point as follows:—

"In tracing the connection between suppressed perspiration and the production of individual diseases, we shall find that those organs which possess some similarity of function sympathize most closely with each other. Thus the skin, the bowels, the lungs, the liver, and the kidneys, sympathize readily, because they have all the common office of throwing waste matter out of the system, each in a way peculiar to its own structure; so that if the exhalation from the skin, for example, be stopped by long exposure to cold, the large quantity of waste matter which it was charged to excrete, and which in itself is hurtful to the system, will most probably be thrown upon one or other of the above-named organs, whose function will consequently become excited; and if any of them, from constitutional or accidental causes, be already weaker than the rest, as often happens, its health will naturally be the first to suffer. In this way, the bowels become irritated in one individual, and occasion bowel complaint; while in another, it is the lungs which become affected, giving rise to catarrh or common cold, or perhaps even to inflammation. When, on the other hand, all these organs are in a state of vigorous health, a temporary increase of function takes place in them, and relieves the system, without leading to any local disorder; and the skin itself speedily resumes its activity, and restores the balance among them.

"One of the most obvious illustrations of this reciprocity of action is afforded by any convivial company, seated in a warm room in a cold evening, The heat of the room, the food and wine, and the excitement of the moment, stimulate the skin, cause an afflux of blood to the surface, and increase in a high degree the flow of the insensible perspiration; which thus, while the heat continues, carries off an undue share of the fluids of the body, and leaves the kidneys almost at rest. But the moment the company goes into the cold external air, a sudden reversal of operations takes place; the cold chills the surface, stops the perspiration, and directs the current of the blood towards the internal organs, which presently become excited—and, under this excitation, the kidneys, for example, will in a few minutes secrete as much of their peculiar fluid, as they did in as many of the preceding hours. The reverse of this again, is common in diseases obstructing the secretion from the kidneys; for the perspiration from the skin is then altered in

quantity and quality, and acquires much of the peculiar smell of the urinary fluid.

"When the lungs are weak, and their lining membrane is habitually relaxed, and secretes an unusual amount of mucus from its surface, the mass thrown inwards upon the lungs by cold applied to the skin, increases that secretion to a high degree. Were this secretion to accumulate, it would soon fill up the air-cells of the lungs, and cause suffocation; but to obviate this danger, the Creator has so constituted the lungs, that accumulated mucus or any foreign body coming in contact with them, excites the convulsive effort called coughing, by which a violent and rapid expiration takes place, with a force sufficient to hurry the mucus or other foreign body along with it; just as peas are discharged by boys with much force through short tubes by a sudden effort of blowing. Thus, a check given to perspiration, by diminishing the quantity of blood previously circulating on the surface, naturally leads very often to increased expectoration and cough, or, in other words, to common cold.

"The lungs excrete, as already noticed, and as we shall afterwards more fully see, a large proportion of waste materials from the system; and the kidneys, the liver, and the bowels, have in so far a similar office. In consequence of this alliance with the skin, these parts are more intimately connected with each other in healthy and diseased action than with other organs. But it is a general law, that whenever an organ is unusually delicate, it will be affected by any cause of disease more easily than those which are sound: so that, if the nervous system, for example, be weaker than other parts, a chill will be more likely to disturb its health than that of the lungs, which are supposed, in this instance, to be constitutionally stronger; or, if the muscular and fibrous organizations be unusually susceptible of disturbance, either from previous illness or from natural predisposition, *they* will be the first to suffer, and rheumatism may ensue; and so on. And hence the utility to the physician of an intimate acquaintance with the previous habits and constitutions of his patients, and the advantage of adapting the remedies to the nature of the cause, when it can be discovered, as well as to the disease itself. A bowel complaint, for instance, may arise from over-eating as well as from a check to perspiration; but although the thing to be cured is the same, the MEANS of cure ought obviously to be different. In the one instance, an emetic or laxative to carry off the offending cause, and in the other a diaphoretic to open the skin, will be the most rational and efficacious remedies. Facts like these expose well the glaring ignorance and effrontery of the quack, who affirms that his one remedy will cure every form of disease. Were the public not equally ignorant with himself, their credulity would cease to afford to his presumption the rich field in which it now revels.

"The close sympathy between the skin and the stomach and bowels has often been noticed, and it is now well understood that most of the obstinate eruptions which appear on the face and rest of the surface, owe their origin to disorders of the digestive organs,

and are most successfully cured by treatment directed to the internal disease. Even among the lower animals, the sympathy between the two is so marked as to have arrested attention. Thus, in speaking of the horse, Delabere Blaine says, 'By a well-known consent of parts between the skin and alimentary canal in general, but between the first passages and the stomach in particular, it follows, in almost every instance, that when one of these becomes affected, the other takes on a sympathetic derangement also, and the condition is then morbid throughout. From close observation and the accumulation of numerous facts, I am disposed to think, that so perfect is this sympathetic consent between these two distant parts or organs, that they change the order of attack as circumstances occur. Thus, when the skin is primarily affected, the stomach becomes secondarily so, and vice versa,' so that 'a sudden check to the natural or acquired heat of the body, particularly if aggravated by the evaporation of a perspiring state,' as often brings on disease of some internal organ, as if the cause were applied to the organ itself.

"In noticing this connection between the suppression of perspiration and the appearance of internal disease, I do not mean to affirm that the effect is produced by the physical transference of the suppressed exhalation to the internal organ. In many instances, the chief impression seems to be made on the nervous system; and the manner in which it gives rise to the resulting disease is often extremely obscure. Our knowledge of the animal functions is, indeed, still so imperfect, that we daily meet with many occurrences of which no explanation can be given. But it is nevertheless of high utility to make known the fact, that a connection does exist between two orders of phenomena, as it calls attention to their more accurate observation, and leads to the adoption of useful practical rules, even when their mode of operation is not understood. Nothing, indeed, can be more delusive than the rash application of merely physical laws to the explanation of the phenomena of living beings. Vitality is a principle superior to, and in continual warfare with, the laws which regulate the actions of inanimate bodies; and it is only after life has become extinct that these laws regain the mastery, and lead to the rapid decomposition of the animal machine. In studying the functions of the human body, therefore, we must be careful not to hurry to conclusions, before taking time to examine the influence of the vital principle in modifying the expected results.

"It is in consequence of the sympathy and reciprocity of action existing between the skin and the internal organs that burns and even scalds of no very great extent prove fatal, by inducing ininternal, generally intestinal, inflammation. By disordering or disorganizing a large nervous and exhaling surface, an extensive burn causes not only a violent nervous commotion, but a continued partial suspension of an important excretion; and, when death ensues at some distance of time, it is almost always in consequence of inflammation being excited in the bowels or sympathizing organ.

So intimate, indeed, is this connection, that some surgeons of great experience, such as the late Baron DUPUYTREN, of the Hotel Dieu, while they point to internal inflammation as in such cases the general cause of death, doubt if recovery ever takes place, when more than one-eighth of the surface of the body is severely burnt. And whether this estimate be correct or not, the facts from which it is drawn clearly demonstrate the importance of the relation subsisting betwixt the skin and the other excreting organs.

"In some constitutions, a singular enough sympathy exists between the skin and the bowels. Dr. A. T. THOMSON, in his work on Materia Medica, (p. 42,) mentions that he is acquainted with a clergyman who cannot bear the skin to be sponged with vinegar and water, or any diluted acid, without suffering spasm and violent griping of the bowels. The reverse operation of this sympathy is exemplified in the frequent production of nettle-rash and other eruptions on the skin, by shell-fish and other substances taken into the stomach. Dr. Thomson tells us, that the late Dr. Gregory could not eat the smallest portion of the white of an egg, without experiencing an attack of an eruption like nettle-rash. According to the same author, even strawberries have been known to cause fainting, followed by a petechial efflorescence of the skin.

"We have seen that the insensible perspiration removes from the system, without trouble and without consciousness, a large quantity of useless materials, and at the same time keeps the skin soft and moist, and thereby fits it for the performance of its functions as the organ of an external sense. In addition to these purposes, the Creator has, in his omniscience and foresight, and with that regard to simplicity of means which betokens a profoundness of thought inconceivable to us, superadded another, scarcely less important, and which is in some degree implied in the former; I mean the proper regulation of the bodily heat. It is well known that, in the polar regions and in the torrid zone, under every variety of circumstances, the human body retains nearly the same temperature, however different may be that of the air by which it is surrounded. This is a property peculiar to life, and, in consequence of it, even vegetables have a power of modifying their own temperature, though in a much more limited degree. Without this power of adaptation, it is obvious that man must have been chained for life to the climate which gave him birth, and even then have suffered constantly from the change of seasons; whereas, by possessing it, he can retain life in a temperature sufficiently cold to freeze mercury, and is able for a time to sustain, unharmed, a heat more than sufficient to boil water, or even to bake meat. Witness the wintering of Captain Parry and his companions in the Polar Regions; and the experiments of Blagden, Sir Joseph Banks, and others, who remained for many minutes in a room heated to 260°, or about 50° above the temperature of boiling water. The chief agents in this wonderful adaptation of man to his external situation, are undoubtedly the skin and the lungs, in both of which the power is intimately connected with the condition of their respective exha-

lations. But it is of the skin alone, as an agent in reducing animal heat, that we are at present to speak.

"The sources of animal heat are not yet demonstrably ascertained; but that it is constantly generated and constantly expended has been long known; and if any considerable disproportion occurs between these processes, it is at the immediate risk of health. During repose, or passive exercise, such as riding in a carriage or sailing, the surplus heat is readily carried off by the insensible perspiration from the lungs and skin, and by the contact of the colder air; but when the amount of heat generated is increased, as during active exercise, an increased expenditure becomes immediately necessary."

103. COLDS AND THEIR CONSEQUENCES.

Colds are caused by, and even consist in, SUPPRESSED PERSPIRATION; nor in anything else. They are occasioned thus: cold always contracts. This is an established law of things. Hence, a sudden change of the temperature of the skin from heat to cold, causes its pores to contract; many of them it closes. This shows why we perspire so little in colds, and also in fevers—especially obdurate colds. Nor do they consist in anything else than this closing of these pores. And the injury they inflict arises mainly from their shutting up this waste matter in the system. And the reason why, during colds, the lungs, nose, etc., discharge copiously a thick, yel low phlegm, is, that this corruption, shut in by the closing of these pores, yet being hostile to life, is carried to the lungs, and converted into phlegm, to the kidneys, bowels, and even to the brain, and discharged through the nose and all the other outlets; and hence that increase of all these secretions as mentioned by Combe.

Many of us know by experience, that these cold customers are exceedingly troublesome—know how dull, feverish, restless, and miserable they render us, and how full of aches, and pains they fill us. Colds are the principal cause of teeth-aches. If you have a bad tooth, it rarely troubles you except after you have taken cold, and the way to cure this painful malady is, to cure that cold which is its exciting cause.

Fevers too, are mainly the results of colds. That sand-bar of health, the fever and ague, makes its attack in company with colds. Avoid them, and you escape it. And those

neighborhood distempers or epidemics which sweep over city and country, affecting nearly all, prostrating many, and cutting off more or less in the midst of life, are generally only colds, and are thus prevalent because certain states of the atmosphere have conspired to occasion colds, and these the choleras, influenzas, or other prevailing diseases. Avoid these colds, and these plagues will pass you by as those of Egypt did the Israelites. Nor can you have a cold without having a fever. Hence the fallacy of that proverb, "stuff a cold and starve a fever," for colds cause fevers. Though fevers may be caused by other violations of the laws of health, yet colds always induce fevers. Hence, the adage "stuff a cold and starve a fever," is erroneous. Bilious, and kindred attacks will be found almost always to have supervened on very severe colds, they generally commencing with chills, just as colds do; and though the stomach is also disabled, yet, but for the cold, the stomach would not have been broken down. It may have been previously foul, and have thus generated by means of imperfect digestion, a great amount of corruption, which, however, open pores would have continued to carry off; whereas, this outlet closed, it is retained, accumulates, obstructs, poisons, and at length prostrates, perhaps destroys life. I do not hesitate to reiterate what I have long and widely declared, in lectures and works, that I regard colds as the cause of more than half the diseases of our climate—of nearly all except those created by impaired digestion. Indeed, even when the latter breeds disease perpetually, open pores carry it off as continually, so that little damage is done. But shut these pores, and besides the waste matter retained, all that corruption engendered by imperfection in any of the vital organs, is also shut in to poison and destroy. In short, keep clear of colds, and you will escape disease; because other causes will rarely be sufficient to induce them. As five-eighths of the waste matter of the vital process escapes through the skin, why should not the closing of this avenue occasion that proportion of the diseases prevalent? Many will think I attribute more disease to colds than really belongs to them; but let such look at the universal fact, that they

always precede and induce consumption, that great mower of human life. Did you ever know a consumptive patient whose attack did not set in after a terrible cold?—or rather, was not that cold protracted and aggravated? Colds induce coughs, as just explained by Combe, and that pulmonary irritation, cough, and final consumption of the lungs, which constitutes this mortal enemy to life, consist in nothing more nor less than an obstinate cold. I care not how predisposed, hereditarily or practically, persons may be to consumption, they will never have it till they take a "heavy cold." Keep clear of these precursors and ushers of this disease, and I will insure your life against the disease itself. And those thus predisposed, should, in a special manner, guard against contracting colds, and when taken, break them up as QUICKLY AS POSSIBLE; for their LIFE depends upon the issue.

Children still farther illustrate this principle. They rarely if ever sicken till they get COLD. Of the correctness of this assertion, let observation be the test. All colds do not make them down sick, yet they very rarely become sick till they have taken cold. Keep them from the latter, and I will guarantee them against sickness. Even when their disease appears to be seated in the stomach or other organs, its origin will generally be found in suppressed perspiration, as shown in the extract from Combe. All cramps and lung difficulties, are of course the direct products of colds. So are all brain-fevers. So are all influenzas, and almost all complaints incident to childhood. Keep the young from taking colds, or break up all colds as soon as contracted, and they will never be sick, nor die except of old age.

Rheumatic affections also prove and illustrate our doctrine. It is submitted to all thus afflicted, be it more or less, whether these pains in their joints, muscles, and bones are not doubled and re-doubled every time you take cold. The same holds true of the head-ache—generally a rheumatic affection of the brain.

An anecdote. While lecturing in East Bradford, Mass., in 1844, a promising youth took a most violent cold which induced a correspondingly violent fever, and hurried him into his

grave. Another brother, while attending the funeral of this one, also took a terrible cold, which, in a few days, swept him also into eternity! A sister, exhausted by watching this brother, also took a very severe cold while attending his funeral, and, in consequence, was soon bereft of reason, and then attacked with a scorching fever, of which she died in about a week. All three deaths were distinctly traceable to colds. Three or four other members of this self-afflicted family were also sick simultaneously, of colds, the weather at the time of these funerals being particularly unfavorable.

Reader, trace the sickness around you back and up to its cause, and you will be surprised to find colds the author of nine cases in every ten. I can remember no sickness in my life not induced by this cause. Recall your own ailings, and see if this principle does not explain their origin.

But why particularize farther? Do not these instances, cognizant to the experience of most, and the observation of all, prove that colds are the chief causes of disease? And these distinctions made by physicians between different forms of fever, and other diseases, are not founded in the NATURE of such diseases, but only different modes of attack, and manifestation of the same disease—the closing of the pores.

109. THE PREVENTION OF COLDS,

Therefore, becomes as important as such colds are injurious. To consumptive subjects, such prevention is life, as these colds are death. How, then, can they be prevented?

BY KEEPING THE SKIN ACTIVE. The system manufactures a great amount of heat[92]. That heat is abundant at the surface so as to fortify it against those changes of temperature which affect the skin mainly. Hence the great accumulation of blood-vessels at the surface of the body. Probably no part of the body, the head possibly excepted, is as abundantly supplied with blood-vessels as the skin. Hence its warmth. Now vigorous surface circulation will keep these pores so warm as to resist the closing action of the external cold. In such cases these atmospheric changes do no evil. They close the pores

only where the surface circulation has become impaired. Keep that vigorous, and it will ward off all colds, extreme cases of exposure possibly excepted. Whatever, therefore, tends to promote the activity of the skin, thereby fortifies the system against colds. The two means of promoting such action, are the promotion of circulation in general, and the external application of friction and water.

110. BATHS, AND THEIR MODES OF APPLICATION.

To say nothing of the ablution of the entire person as a means of cleanliness, or of the surprising quantity of scurf brought off by occasional baths and friction, and the consequent opening of the pores, the habitual practice of bathing will be found effectually to fortify the system against colds. Though constitutionally consumptive, and predisposed to colds, the author has not taken a cold on the average in two years since he adopted the practice of bathing regularly every day or two; and all he has taken, but one, have been contracted after he had suspended these baths for weeks previously, because especially inconvenient. Nor would the wealth of Astor compensate for a discontinuance of this practice, because colds, with all their evils, would soon follow, and inevitably usher in consumption, and thus end his days. And any reader not accustomed to frequent bathing, would actually find a greater prize in its judicious application than if he should inherit the fortune of all the Rothschilds, because by removing diseases and their causes—obstructions—as well as prolonging life[21], it will promote general enjoyment more than all the wealth of the world! Nothing would tempt me to do without my bath. Its habitual use renders me COLD PROOF, and keeps both hereditary and acquired predispositions to disease at bay, as well as doubles and trebles my ability to endure both physical and mental exertion. Even as a luxury it is equalled only by food and sleep. I go to it, not with dread, but with alacrity, on account of the pleasure it gives me. And this pleasure is the greater the colder the weather, because of the greater re-action and subsequent delightful glow. Still, it must be rightly managed, else it results in

evil proportionate to its good. The cold bath should never be taken except where there is sufficient energy in the system to produce a delightful RE-ACTION AND SUBSEQUENT GLOW—these sure signs and concomitants of its utility. A. Combe remarks on this point as follows :—

"For GENERAL use, the tepid or warm bath seems to me much more suitable than the cold bath, especially in winter, and for those who are not robust and full of animal heat. Where the constitution is not sufficiently vigorous to secure reaction after the cold bath, as indicated by a warm glow over the surface, its use inevitably does harm. A vast number of persons are in this condition; while, on the contrary there are few indeed who did not derive evident advantage from the regular use of the tepid bath, and still fewer who are hurt by it.

"Where the health is good, and the bodily powers are sufficiently vigorous, the cold bath during summer, and the shower bath in winter may serve every purpose required from them. But it should never be forgotten, that they are too powerful in their agency to be used by EVERY ONE, especially in cold weather. In proportion as cold bathing is influential in the restoration of health when judiciously used, it is hurtful when resorted to without discrimination; and invalids, therefore, ought never to have recourse to it without the sanction of their professional advisers.

"Even where cold bathing is likely to be of service, when judiciously employed, much mischief often results from prolonging the immersion too long, or from resorting to it when the vital powers are too languid to admit of the necessary reaction—before breakfast for example, or after fatigue. For this reason, many persons derive much benefit from bathing early in the forenoon, who, when they bathe in the morning before taking any sustenance, do not speedily recover their natural heat and elasticity of feeling.

"For those who are not robust, daily sponging of the body with cold water and vinegar, or with salt water, is the best substitute for the cold bath, and may be resorted to with safety and advantage in most states of the system; especially when care is taken to excite in the surface, by subsequent friction with the flesh-brush or hair-glove, the healthy glow of reaction. It then becomes an excellent preservative from the effects of changeable weather. When, however, a continued sensation of coldness or chill is perceptible over the body, sponging ought not to be persisted in: dry friction, aided by the tepid bath, is then greatly preferable, and often proves highly serviceable in keeping up the due action of the skin.

"For habitual use, the tepid or warm bath is certainly the safest and most valuable, especially during the autumn, winter, and spring, and for invalids. A temperature ranging from 85° to 98°, according to the state of the individual, is the most suitable; and the duration

of the immersion may vary from fifteen minutes to an hour or more, according to circumstances. As a general rule, the water ought to be warm enough to feel pleasant without giving a positive sensation of heat; the degree at which this happens varies considerably according to the constitution and to the state of health at the time. Sometimes, when the generation of animal heat is great, a bath at 95° will be felt disagreeably warm and relaxing; while, at another time, when the animal heat is produced in deficient quantity, the same temperature will cause a chilly sensation. The rule, then, is to avoid equally the positive impressions of heat and cold, and to seek the agreeable medium. A bath of the latter description is the reverse of relaxing; it gives a cheerful tone and activity to all the functions, and may be used every day, or on alternate days, for fifteen or twenty minutes, with much advantage.

"A person of sound health and strength may take a bath at any time, except immediately after meals. But the BEST time for valetudinarians is in the forenoon or evening, two or three hours after a moderate meal, when the system is invigorated by food, but not oppressed by the labor of digestion. When the bath is delayed till five or six hours after eating, delicate people sometimes become faint under its operation, and, from the absence of reaction, are rather weakened by the relaxation it then induces. As a general rule, active exertion ought to be avoided for an hour or two after using the warm or tepid bath; and, unless we wish to induce perspiration, it ought not to be taken immediately before going to bed; or if it is, it ought to be merely tepid, and not of too long duration.

"These rules apply of course only to persons in an ordinary state of health. If organic disease, headache, feverishness, constipation, or other ailment exist, bathing ought never to be employed without medical advice. When the stomach is disordered by bile, it also generally disagrees. But that it is a safe and valuable preservative of health in ordinary circumstances, and an active remedy in disease, is most certain. Instead of being dangerous by causing liability to cold, it is, when well managed, so much the reverse, that the author of these pages has used it much and successfully for the express purpose of diminishing such liability, both in himself and in others in whom the chest is delicate. In his own instance, in particular, he is conscious of having derived much advantage from its regular employment, especially in the colder months of the year, during which he has uniformly found himself most effectually strengthened against the impression of cold, by repeating the bath at shorter intervals than usual.

"In many manufactories, where warm water is always obtainable, it would be of very great advantage to have a few baths erected for the use of the operatives. Not only would these be useful in promoting health and cleanliness, but they would, by their refreshing and soothing influence, diminish the craving for stimulus which leads so many to the gin-shop; and, at the same time, calm the irritability of mind so apt to be induced by excessive labor. Where the trade is dirty, as many trades necessarily are, it is needless to

say how conducive to health and comfort a tepid bath would be on quitting it for the day.

"On the Continent, the vapor and hot air-baths are had recourse to, both as a means of health and in the cure of disease, to a vastly greater extent than they are in this country. Their use is attended by the very best effects, particularly in chronic ailments, and where the water-bath is felt to be oppressive by its weight; and there can be no question that their action is chiefly on the skin, and through its medium on the nervous system. As a means of determining the blood to the surface, promoting cutaneous exhalation, and equalizing the circulation, they are second to no remedy now in use: and consequently, in a variety of affections which the encouragement of these processes is calculated to relieve, they may be employed with every prospect of advantage. The prevalent fear of catching cold, which deters many from using the vapor-bath, even more than from warm bathing, is founded on a false analogy between its effects and those of profuse perspiration from exercise or illness. The latter weakens the body, and, by diminishing the power of reaction, renders it susceptible of injury from sudden changes of temperature. But the effect of the vapor-bath properly administered is very different. When not too warm or too long continued, it increases instead of exhausting the strength, and, by exciting the vital action of the skin, gives rise to a power of reaction which enables it to resist cold better than before. This I have heard many patients remark; and the fact is well exemplified in Russia and the north of Europe, where, in the depth of winter, it is not uncommon for the natives to rush out of a vapor-bath and roll themselves in the snow, and be refreshed by doing so; whereas, were they to attempt such a practice after severe perspiration from exercise, they would inevitably suffer. It is the previous stimulus given to the skin by the vapor-bath which is the real safeguard against the coldness of the snow.

"Common experience affords another illustration of the same principle. If, in a cold winter day, we chance to sit for some time in a room imperfectly warmed, and feel in consequence a sensation of chillness over the body, we are much more likely to catch cold on going out, than if we had been sitting in a room comfortably warm. In the latter case, the cutaneous circulation and nervous action go on vigorously; heat is freely generated, and the vital action of the skin is in its full force. The change to a lower temperature, if accompanied with exercise to keep up vitality, is then felt to be bracing and stimulating rather than disagreeable. But it is widely different when the surface is already chilled before going out. The vitality of the skin being diminished, reaction cannot follow additional exposure; the circulation leaves the surface and becomes still more internal; and if weakness exist in the throat or chest, cold is the almost certain result. Many suffer from ignorance of this principle.

"The vapor-bath is thus calculated to be extensively useful, both as a preservative and as a remedial agent. Many a cold and many

a rheumatic attack arising from checked perspiration or long exposure to the weather, might be nipped in the bud by its timely use. In chronic affections, not only of the skin itself, but of the internal organs with which the skin most closely sympathizes, as the stomach and intestines, the judicious application of the vapor-bath is productive of great relief. Even in chronic pulmonary complaints, it is, according to the continental physicians, not only safe, but very serviceable; particularly in those affections of the mucous membrane which resemble consumption in so many of their symptoms. Like all powerful remedies, however, the vapor-bath must be administered with proper regard to the condition and circumstances of the individual; and care must be taken to have the feet sufficiently warm during its use. If, from an irregular distribution of the steam, the feet be left cold, headache and flushing are almost sure to follow."

My own preferences side unequivocally in favor of the HAND bath as preferable to all others, because it is more easily applied, requires much bodily exertion, which facilitates the required re-action, and can be discontinued the instant a chilly sensation begins to supervene, beyond which no bath should ever be continued a single moment. Salt, vinegar, and other stimulants added to the water, facilitate this re-action by exciting the skin, as does also sea-bathing, which, under certain circumstances, is most excellent. But we dismiss this subject till we come to treat of water as a remedial agent.

111. THE CURE OF COLDS BY PERSPIRATION

Next comes up for discussion; for if they can be cured soon after having been contracted, the accumulation of waste matter will be trifling, and therefore only slightly injurious. How then, can colds be cured?

BY OPENING THE PORES, the closing of which caused them. This opening can be affected in part by washing and rubbing, but PERSPIRATION forces them open more effectually than probably any other means whatever. Indeed, it is the great antidote of colds and their dread array of consequences. Nor is it material what induces this perspiration, so that it is copious, and does not eventuate in another cold. Where the patient is able to exercise sufficiently to burst open these pores, whether he takes this exercise out of doors or in a warm or cold atmosphere, is not material, so that he induces it. In

short, get into a dripping SWEAT, and then cool off without contracting more cold, and you will drive it off, as well as feel many fold better.

Where colds are taken in their incipient stages, before they have prostrated the system, the best means of breaking them up, is to drink copiously of water, warm or cold, or of warm lemonade, or of currant jelly and warm water, or warm composition-tea, which is excellent to start perspiration, and then work right hard, almost violently, meanwhile pouring down one or another of these drinks by the quart. Do not over-do so as completely to exhaust, but so as to secure profuse perspiration. This, together with the water, which, if taken in quantities, MUST have some exit, will re-open these closed pores, and destroy the disease. Females who can wash in a warm room, over the steam of hot water, will find this an infallible recipe for colds. Warm herb-teas will fill the place of water, yet are no better in their effects, and less liable to be taken on account of their bitterness.

Soaking the feet in hot water, and then toasting them on retiring, meanwhile drinking copiously as above directed, and then covering up extra warm, or even the extra drinking and covering will answer the same purpose; yet care must be taken to keep the extra clothes on so as not to contract a new cold—the principal evil attendant on this simple and effectual cure. How many of us while young, cured our colds thus? But I recommend the daytime. Eat little or no breakfast, but drink copiously of cold water for an hour or two after rising, and provided you can endure it, exercise vigorously, and then return to bed, cover up warm, and sweat till your hands begin to shrivel. Sleep if you can. On rising, wash all over in warm saleratus water, rub dry and briskly, and keep in a gentle perspiration all day by exercise. Or eat little breakfast, and begin to drink and exercise about eleven in the forenoon, or even later, and pursue the same course, omitting dinner, and eat only a light supper, or at least a light dinner, and very light supper, and retire early, or as soon after you have done exercise as possible, so as not to renew your cold.

The warm bath, followed by friction and exercise, is also most excellent, and will generally prove efficacious. Yet here, too, care must be taken to guard against renewed colds—not by staying in the house, or muffling up, but by EXERCISE—the very best means of inducing perspiration in the world, because the most natural. The wet sheet is another excellent method, especially for those who are not able to exercise sufficiently to to get up the required perspiration ; yet of this, and also of the water-cure in their appropriate places. SECURE COPIOUS PERSPIRATION and you break up your cold, besides unloading the system of its obstructions and poisons. Evacuating the bowels, especially by injections, will facilitate your object, yet the water drank will be likely to effect this object—not indispensable, yet an aid. Vomiting, especially by drinking warm water, just at the lukewarm, sickening temperature, will render essential service. Hot bricks wrapped in wet cloths, and laid at the feet, are good.

112. GLASS BLOWERS

Furnish an excellent illustration of our doctrine of routing colds by inducing perspiration. Obliged to labor excessively hard, and around a furnace so extremely hot as to keep the material at a white heat, they of course sweat profusely. I have often seen all their clothes wringing wet. Yet the sides of the building are open to the wind, else they could not endure the heat an hour. And they go from their furnaces to their houses while thus perspiring, and hence often take severe colds one day, which, however, they generally sweat out the next, so that these repeated colds make but short stay, and do but little damage ; simply because they expel them by inducing copious perspiration. This simple fact furnishes a practical illustration of the true method of curing colds, of great practical value. As colds consist in a closing of the pores, so forcing them open by sweating is a sovereign and universal cure for these disease-breeders.

Sometimes the required perspiration is spontaneous. Children often sweat freely while asleep, awaking only to call for water. This should be considered a most favorable symp-

tom; and the desired water should be freely administered till they wake up, when they should be washed off in saleratus-water, followed by friction and brisk play, so as to keep it up. Yet care should be taken not to contract additional cold.

In fine, to break up colds, START THE SWEAT, by what means it matters little, so that it is copious, protracted, and not followed by more cold.

SECTION IV.

THE REGULATION OF THE TEMPERATURE BY FIRE AND CLOTHING—THEIR KINDS AND AMOUNTS.

113. COOLING EFFECTS OF PERSPIRATION.

PERSPIRATION, besides thus unloading the system of disease, also serves to REGULATE the temperature of the body. The necessity of uniformity of temperature—neither too nigh nor too low—has already been explained [90]; as has also the means by which it is generated. But it at times SUPERABOUNDS. When the system is full of carbon, if we exercise vigorously, so as to breathe freely and thereby introduce great quantities of oxygen into the system, we of course manufacture an undue supply especially in warm weather, when heat does not pass off readily. Now this extra heat must be evacuated, else it will melt the fat in the system, and relax and prostrate. This important evacuation of the surplus warmth is effected by perspiration as follows. All bodies absorb heat when passing from a dense medium to one that is more rare. Thus water, in passing into steam, takes up a great amount of heat, which it again gives off in returning back to water, on the well known chemical principle that all bodies give off heat when passing from a rarer medium to a denser. Here, again, water becomes a porter. An excess of heat aids the conversion of water into steam, which then takes up this surplus heat, carries it out of the system, and gives it off again while condensing back to

water—a self-acting and most efficacious arrangement for effecting an indispensable end.

This explains why it is that men can remain in ovens heated hot enough to cook meat, and long enough to bake it, without destroying life. They SWEAT OUT the surplus heat, or else their own flesh would also bake.

But sometimes the system does not generate sufficient heat. This scarcity must be made up by some means or we must die[90]. This brings up for consideration

114. THE DEFICIENCY OF ANIMAL HEAT.

The following letter to the author shows some of the consequences of a sparse supply of heat.

"John Clark, a native of Connecticut, born more than a century ago, was peculiarly affected by cold weather. In the cool mornings of nearly every month in the year, his hands would become benumbed and almost entirely useless, his tongue stiffened so that he could scarcely articulate, the muscles of his face contracted and stiffened, and one or both eyes closed in a very peculiar manner. This infirmity was hereditary."—*Phrenological Journal*, 1846, *p.* 131.

This was undoubtedly owing to defective lungs, and a consequent want of oxygen in the system. Or there might have been some defect in his digestion, by which a due supply of carbon was not extracted from his food. Many others are also troubled with being habitually cold, even in summer. This is the case with the author, though he is becoming less so yearly. Consumptive parents, and all predisposed to this disease, also feel cold or chilly, and have cold hands and feet, and perhaps what is called goose-flesh on the skin. How can this be remedied?

First, and primarily, by ascertaining and removing its cause, which will almost always be found in deficiency of breath, occasioned by small lungs, or confinement, or a want of sufficient exercise to promote respiration. When this is the cause, the patient may easily perceive it in the fact that all additions to his breathing add to his warmth. And the remedy is plain. He must BREATHE MORE. Nor can he be comfortably warm without it. Two other means are also resorted to

in civic life to secure the required temperature. One of these is

115. FIRE—EVILS OF ITS EXCESS.

That fire is essential to human health and comfort is established by the ample provision for it found in nature. What she supplies, she intends man shall use. Besides being indispensable in many of the arts, as in smelting and casting metals, etc., no one will doubt that fire is useful as a means of animal warmth. When the body is perfectly healthy, vigorous exercise will probably supply all the heat required in the coldest of weather. Yet we often require to apply our minds in a sitting posture, as in writing, reading, listening to speakers, when there is not sufficient action to secure this heat, and when, therefore, fire is both comfortable and indispensable. In cases of exhaustion, sickness, infancy, etc., fire is necessary. But why argue the utility of fire? As well attempt to prove that water is beneficial.

Still, men rely far too much on external heat, and far too little on internal. Though we require fire, yet this alone can never keep us sufficiently warm. How hot, think you, must be the atmosphere to keep the body, inside as well as out, at the temperature of 98°? Hot enough to burn the skin to a crisp. Try the experiment on a corpse. Fire is utterly powerless to keep us duly warm. Most of our heat, indeed all of it, must be generated WITHIN us. The use of fire is to keep us warm by retarding the escape of internal heat, not to actually infuse external heat into us. Those who cannot keep themselves warm by the process already described[92], can never keep warm at all; because in and by the very act of warming a room, you prevent the manufacture of internal heat by rarefying the air, and, when the fire is in the room heated, by burning out much of its oxygen, so that the lungs cannot carry enough to the blood to support the required internal combustion[95]. External heat, therefore, so far from keeping us warm, actually prevents that warmth in the ratio of its intensity That is, the warmer we keep our rooms, the colder we must keep ourselves. All this, besides the smoke and

noxious gases necessarily consequent on burning fuel, especially coal.

To put this matter on the reader's own experience. How many times in your lives, in weather so cold that you could not keep yourself warm in-doors, when compelled to drive out into the cold, have you so accelerated circulation and perspiration as in a few minutes to be quite warm enough, though just before chilly by a hot fire? And this natural warmth is so much more delightful than artificial heat. Out of doors is the place to keep thoroughly warm in cold weather.

You sedentaries know no more about the back-woodsman's table luxuries, than he about your "city fixins," and the way he can beat you keeping warm in cold weather, notwithstanding your hard coal and air-tight stoves, can be known only by trying. If I were again young, and my constitution unimpaired, I would remain where there was fire no more than obliged to, and would never rely on it to warm my feet, or hands, but only on natural warmth. Nor would I accustom myself to mittens, except on extra occasions.

Nor can those who generally occupy warm apartments well imagine how much more brisk, lively, buoyant, intense, and happy the feelings are, and how much more clear and vigorous all the intellectual operations, while one is kept warm by exercise in a cold day, than by sitting in a hot room; nor how lax and listless, in comparison, are we rendered by artificial heat. Abundance of exercise, respiration, and good food, is the great receipt for keeping comfortable in cold weather.

The evils consequent on staying perpetually within doors in cold weather, and in hot rooms, are exposed too forcibly by our subject to require enlargement. Such can obtain only a small supply of oxygen, first, because the air they breathe is so rarefied by heat that a given bulk contains but little; secondly, because the fire has burnt out much of that little, thirdly, because they have breathed what little air there is over and over again, and thus loaded it with carbonic acid gas, and because they exercise so little that they secure but little action in their lungs. Such live slowly, yet are incurring disease.

Fire also creates carbonic acid gas[93], which is of course inhaled into the lungs. Hence, those who occupy heated rooms, instead of carrying off the surplus already in the system, even take on additional supplies, especially if the fire is made of coal, and hence the blue veins and languid feelings of those who keep themselves housed up in winter.

116. DIFFERENT KINDS OF FUEL, STOVES, ETC.,

Are thus brought up for consideration. And here I protest against air-tight stoves in sitting rooms, because they prevent a renewal of the air by circulation, and thus effectually shut out the oxygen. Still air-tights are admissible in the kitchen, where fresh air is introduced by a frequent opening and shutting of doors. If you must be by a fire, at least have a draft.

Hence, none of these close stoves are the things for health. They all paralyze our mental and physical energies while life lasts, and also hasten its termination. Give me the old-fashioned fire-place, or an open Franklin, or else a new kind of stove made wholly of brick called the Russian stove, which, for warming sitting-rooms, is probably superior to any other in use, as it certainly is much less expensive in construction, and more economical in fuel. I never imagined till I used it, how much heat a little wood gives out. It also makes a remarkably even heat.

117. FIRE NECESSARY WHEN THE CIRCULATION IS WEAK.

Let not the preceding remarks be construed to mean that we had better remain cold than warm ourselves by fire. Heat must be had at some rate[90]. Only a slight reduction of temperature induces those colds just shown to be so fatal, and also chills the blood, intercepts circulation, and would soon occasion death. Infinitely better artificial heat than cold. Yet even in sickness, when the circulation is low, better provoke as much natural heat by friction and clothing and rely as little on fire as possible. Invalids, of all others, require oxygen, which artificial heat always and necessarily reduces. I pity those who are obliged to resort to fire for warmth. They

may live along from hand to mouth as to health, yet can never know the real luxury of a comfortable temperature. Such should by all means practice those directions for enhancing the circulation to be given hereafter.

118. CLOTHES, AND THEIR NECESSITY.

That man is constituted to wear some kind of external covering, cannot for a moment be questioned. Otherwise, he would have been furnished with a heavy coating, like what grows on animals. Man was designed to inhabit the whole earth, the frozen regions of the north and south included; where, without some external protection against the extreme rigor of winter he must inevitably freeze to death. Such protection, though it does not generate heat, retards its escape, and thus aids in that indispensable process of heating the body [90]. And by varying the quantity of clothing as the weather changes, we can greatly facilitate that uniformity of temperature so indispensable. This introduces for consideration the

119. QUANTITY OF CLOTHING REQUISITE.

Though clothing is thus necessary, yet by far too much is now worn. The Indian, even in colder latitudes than ours, keeps perfectly comfortable in the coldest weather, with only his blanket thrown loosely around his shoulders—but one thickness, and much of his body exposed directly to the cold. Yet he is far more comfortable with this sparse supply, than we with a quarter of a score of thicknesses, and cotton batting to boot. We need clothing, yet should rely upon it only as a partial regulator of heat, not as our principal warming agent. Clothes, by retarding the escape of heat, cause us to require less food and breath, that is, compensate for the latter. Hence, those who cannot get enough to eat, should dress extra warm, while those who can eat, should dress light. Extra clothing also relaxes the skin, and prevents the generation of animal heat, and this leaves the system colder instead of warmer. If I were again young and robust, I should habituate myself to but little clothing, even in winter, and am wearing less and less every winter—thus relying for warmth

more on nature and less on art. Yet I would not change too suddenly. Better too much, than too little. Keep warm we must; and in leaving off clothing I would augment the internal manufacture of heat by increased exercise and breathing.

As clothing is worn partly to regulate the temperature, its quantity of course requires to be greater in cold weather than warm. Yet I protest against this varying its quantity with every variation of the weather. Nature has rendered this unnecessary by a provision for enhancing the internal heat in the exact ratio of the external cold [95]. This alone shows that we should rely on nature's provision for warmth, instead of on art—should breathe and eat more as the weather becomes colder, instead of dress warmer.

Yet invalids, and those whose circulation is defective, may require such variation. This pernicious habit of civic life in relying so much on clothes, however, modifies our advice. As most of us now are, they benefit, yet we should diminish its necessity by enhancing the internal heat.

120. THE CLOTHING OF CHILDREN.

Few errors are greater than that prevailing custom of wrapping babes up in blanket after blanket as a protection against cold. From the first they are literally smothered with clothing. Besides keeping the nursery quite too warm, the young stranger must have on several thicknesses of its own clothes, and then be covered up most of the time under several thicknesses of bed-clothes with only a small breathing-hole left. It is just as you habituate them, with this difference, that shutting in the animal heat thus, relaxes the skin and paves the way for those colds seen to be so injurious [103]. Extra clothing promotes colds instead of preventing them. I would not have them cold; yet of this, there is little danger. That same self-acting regulator of heat already seen to exist in adults [94], exists also in them. Rely on this, and do not engender disease by extra clothing. They need more clothing than adults, because animal heat is at its minimum at birth, and should not be carried out much, yet they are often well nigh ruined by being over-dressed.

After children have become three years old, they generate animal heat very rapidly, if allowed to play, and therefore require but little clothing. Give them the liberty of the yard, and I'll risk their getting cold, unless they have previously been nursed to death. Mothers, be assured that you are by far too tender of your children in this respect—that you almost kill them—and often quite—by extra dressing. And this muffling up boys with comforts around their necks, in addition to neck wrappers, caps pulled down tight around their ears, warm mittens, warm over-clothes, a cart-load of bed-clothes, and the like, is consummate folly When boys are running out and in, they will keep warm without all this fuss, and doubly so when they are walking[114]. But we shall discuss this whole subject of children's dress in our proposed work on "Maternity."

121. CHANGE OE RAIMENT.

Whether we should increase and diminish our clothing according to the temperature of the weather, we should change it often from motives of HEALTH AND CLEANLINESS. Since perspiration brings out a great amount of corrupt and poisonous matter through the skin[106], most of which is absorbed by the under clothes, of course they should be changed and cleansed frequently. The necessity of this will be rendered apparent by the following experiment. Take off and roll up your under garment, and wash your body, and the unpleasant sensations consequent on putting it on again, show how much corruption it has imbibed, and how repugnant it is to a clean skin. The same sensations are experienced when you return to bed after having been up a few minutes. This also shows the importance of airing and frequently changing the bed-clothes. Nor should we sleep in the under garments worn day-times.

Children's under clothes, in particular, should be changed every day or two, and also every night, because they perspire more copiously even than adults.

122. THE QUALITY OF CLOTHING, FLANNELS, SILKS.

That, considering the weak state of the skin generally in civic life, flannel under garments for cold weather may be advisable, is admitted; yet, in cases where the circulation is vigorous, its utility is doubtful. My practice is to postpone putting it on later and later every fall, and to discontinue its use earlier and earlier every spring. It confines the corrupt matter, transmitted through the skin, too closely around the body[121], that same principle which retains the heat also retaining the poisonous effluvia. Hence it should be changed and washed often, as well as aired at night. This wearing flannels a week or ten days without washing, is doubly prenicious. Canton flannel I think preferable.

Silk is highly extolled for under garments. I have worn it with comfort if not with profit. Yet, like flannel, it retains the perspiration and effluvia of the body. My own convictions favor cotton as furnishing the best material for under and summer clothing.

123. HEAD AND NECK ATTIRE.—THE BEARD.

That nature designed us to wear something on the head, at least as a bandage to keep the hair in place, will not be doubted, but has she not already dressed it in a warm and beautiful garment of hair—one abundantly sufficient to secure the required warmth, at the same time allowing perspiration to escape freely? This, hats and caps prevent, and are, therefore, objectionable. The turban is undoubtedly preferable. Yet I for one prefer to go bareheaded especially in overcast weather. Even rain upon it is particularly agreeable, perhaps on account of its preternatural heat. Be it remembered that whatever oppresses the head thereby blunts thought and stifles feeling.

The mode of dressing the neck is scarcely less important. A tight neck dress is highly injurious, because it retards the flow of blood to and from the head. This perpetual strangulation I cannot endure. I never wear stocks, and regard them as a great evil. Anything but being choked. At home I wear no stock or neck-kerchief, and should never do so

abroad if I could always explain my motives for the omission. Tight neck dresses also cause bronchital affections.

This confinement of the neck also intercepts the escape of the perspiration and effluvia which the heat of the body causes to rise, but which any bandage around the neck hedges in, and retains around the person and in the clothes only to vitiate and disease. The Byronic fashion of dressing the neck is preferable to all others. The true plan ought to be to allow the beard to grow and thus protect the neck and chest. This appendage was not created for naught, and cannot be cut off with impunity.

That a close neck dress is not required on the score of warmth, is evinced by the open mode of dressing the female neck. If woman can keep warm without choking up her neck with tight bandages, surely robust man can.

124. THE HANDS AND ARMS.

The hands should be kept warm, yet this can be done without mittens—and in general better without than with. Rely on natural heat more, and artificial less. Put them on late in the fall, and only in extreme cases, and when they become cold, whip them till they thaw out. And this wearing gloves in summer is perfectly ridiculous. As though human fabrics were more beautiful than Divine! As though hands were homely, and gloves necessary to hide their deformity! This is doubly true of female hands. To encase them in gloves is to hide their beauty. I should feel ashamed to acknowledge, practically, that mine were too homely to be seen. This fashion is scarcely less intrinsically ridiculous than that of wearing the hair over the ears. How extra handsome heads without ears, or with them hid from vision! You sickly exquisites may cover up hands and ears too if you like—may hide all your beauties, or supplant them by deformities—but to my taste, nature is infinitely more beautiful than art.

Uncovered arms, by allowing the free escape of waste matter, greatly promote comfort and health. In his younger days, the author wore his sleeves rolled up in warm weather, and noticed that this custom greatly promoted his comfort.

Franklin describes his "air bath" as a great luxury. The free access of the air to the skin is pre-eminently beneficial, and the more surface thus exposed compatible with warmth the better.

125. WARM FEET.

The proper regimen for these convenient articles of service is very important. And the more so, because whatever injury they sustain is speedily diffused throughout the system. Cold or wet feet are much more prolific of colds and their consequences[108] than almost any other cause; while keeping them warm and healthy generally protects the system from disease. That old saw—"Keep the head cool and feet warm," is full of practical wisdom. In fact, cold feet induce headache by a partial congestion of the brain, nor is there a greater cure for headache than rubbing, washing, soaking, or toasting the feet, because they draw off that extra rush of blood to the head which caused it to ache.

To secure due warmth in the feet, WASH AND RUB THEM OFTEN. Few things are more promotive of health than the daily ablution of the feet. It will nearly double the health of every reader who will practice it, as well as unspeakably enhance his serenity of mind. Jefferson attributed his uniform health, even in advanced life, more to this one practice than to any other. Nor does running in the water in summer do children the damage apprehended. Let every child be brought up to wash the feet, every night on retiring, in cold water. Than the prevailing idea that cold water applied to the feet is injurious, nothing is more erroneous or foolish. Is it poisonous? Nor are wet feet, if WARM, the precursors of the winding sheet, though cold wet feet often breed disease. Keep up the circulation in them, and they may be wet half the time without injury! The great evil is not in wet, but COLD feet, of which the judicious application of cold water is the greatest known preventive.

The proper dressing of the feet so as to secure the required warmth, then, becomes a matter of great importance. Nor should reliance for keeping them warm be placed on shoes,

stockings, and fires. The principles of fires and dress already applied to the body apply equally to the feet. Almost exclusive reliance should be placed on vigorous CIRCULATION, as secured by exercise and washing, not on stockings, boots, and over-shoes. In fact, the latter generally IMPAIR circulation, and thus induce coldness of the feet instead of warmth. In general, the lighter dressed the warmer, provided they have sufficient EXERCISE.

Stockings are decidedly injurious especially on young children. They need mittens quite as much. Stockings retain the perspiration, and this invites cold. Experiment will satisfy all who try it, that feet keep warmer without than with them. Try it, and you will be surprised at the result. A friend of mine was wakened early one cold winter morning, in 1844, to take some travelling conveyance which could not wait, and unable to find both his stockings, started off with but one, intending to get a pair at the first stopping-place. But, finding the unstockinged foot the warmest, he postponed several days, when, still finding it the warmest, he discontinued the use of the other, and has done so ever since, and says his feet are much warmer for it. All similar trials that have come to the author's knowledge have resulted similarly. Yet it is recommended that the experiment be commenced in midsummer, and that the feet be washed daily. These views may seem strange, because contrary to custom; but try before you condemn.

Heating the feet with brick, stones, and the like, is also injurious. Warm them by walking, stamping, and the like, instead. And in riding, by far the best plan of warming them is to get out and walk or run.

GOING BAREFOOT in summer is not, then, so very injurious to children. All love it dearly, and this is nature's warrant for its utility[1]. The soles of their feet are furnished from birth with a thick epidermis, which going barefoot renders very thick and tough, and abundantly protects them from injury, of which all poor and barefoot subjects are examples. Nor will it give them cold, but it will prevent sickness by promoting health and circulation in the feet.

"But how they look barefoot!" exclaim fastidious mothers. What was said of covering the hands[124] applies equally to dressing the feet. If bare feet were fashionable, they would look no worse than bare faces or hands. The Persians esteem uncovered faces as ugly looking as we do uncovered feet; whereas feet are quite ornamental as well as useful, and children look almost as bad with them muffled up in summer as ladies do with covered ears. Still, "every one to his liking."

"But unconfined feet grow large, broad, and homely," it is farther objected. Then do go to China and done with it. As though cramping the feet, and preventing their natural development, increases their beauty! As though you could improve on nature, and correct her deformities by art! My philosophy is to let nature "have her perfect work," yet you who choose may warp and cramp her to your liking.

SECTION V.

SLEEP—ITS NECESSITY, FUNCTION, DURATION, SEASON, PROMOTION, POSTURES, AND APARTMENTS.

126. ITS NECESSITY, AND OFFICE.

ALL that lives must sleep. Even the entire vegetable kingdom sleeps profoundly in winter to wake up with renewed vigor on the opening of spring. All animal life, from snail to man, must also rest or die. Nature COMPELS it, nor can any human will or effort forego it. Nor can we be better employed than when thus renewing our vital energies.*

This imperious demand for sleep indicates a function absolutely indispensable to the continuance of life. What that office is, science has not yet told us for certain, yet, in all probability, it secures ASSIMILATION or the appropriation of the

* I saw a Scotchman in Boston, in 1843, who claimed, no doubt sincerely, to have slept but once in seven years, yet I saw him assume an easy posture, close his eyes, nod, and appear for all the world just as others do when they doze.

materials of life, in their respective formations. This view is supported by the fact that we grow larger during sleep, and taller by about half an inch, whereas we grow that much shorter during the day. The fact that growing children sleep very soundly and a great deal, mature age less, and old age still less—their sleep not being sound—also confirms this view. But, be its office what it may, its necessity is absolute.

127. AMOUNT AND DURATION OF SLEEP.

This requisition for sleep of course requires sleep enough. Its deficiency is scarcely less injurious than deficiency of food. Yet we can over sleep as well as over eat and exercise. The due medium is the great desideratum. Physiologists differ as to the length of time required, and well they may, because different persons require different lengths, according to circumstances. Yet there is a right length, nor is its determination difficult.

The time spent in sleep furnishes no criterion of its amount, because some sleep more in an hour than others in a night. Some may doze away half their time, yet be starved for rest, while others sleep abundantly in four or five hours—all depending on its soundness and previous fatigue.

While the constitution remains unimpaired, the sleep is sound and refreshing, so that five or six hours in the twenty-four are probably sufficient, yet broken constitutions require eight, or even more. Over-eating also requires additional sleep, as does also excessive toil of any kind, of which all are experimental witnesses. All disorders of the stomach and nervous system also require additional time for sleep, because then it is less refreshing. Hence, different persons require to sleep different lengths of time, and even the same person under different circumstances. Exceedingly active persons—those who, when awake, are wide awake, also require to sleep longer than those who are half asleep when awake. Convalescents also require to sleep more than usual. Each must, therefore, judge for himself, and while all should sleep enough, none should sleep too much. Over-sleeping is as injurious as gluttony. How stupid, palsied, and good-for-nothing it ren-

ders us, as all can doubtless testify. Our own appetite for sleep, as for food[69], unperverted, furnishes us with an infallible guide. Nature will rouse us to consciousness when our sleep is out. And when thus aroused, all should spring at once from their couch. To hug the pillow, half asleep and half awake, is most pernicious, and, like over-eating, only craves the more, besides too often inducing, or at least facilitating, impure feelings, which too often result in vice. Would that I could duly impress, especially on youth, the importance of rising immediately on waking.

128. SEASON—EARLY RISING.

That nature clearly indicates night as the best time for sleep is too apparent to require proof. It is doubtful whether we should sleep from evening to morning twilight, but what time we do sleep, should be in the night, except in cases to be mentioned. This sitting up half the night and sleeping half the next day, reverses the ordinances of nature, and must therefore prove injurious. Extraordinaries excepted all should rise with the break of day, and especially children, who should retire soon after the hens do. Better sleep mornings than too little, yet either retire the earlier, so as to have your sleep out at least before sun-rise, or else take a short nap in the middle of the day. Those whose previously formed habits prevent their going to sleep early, even when they go to bed, should break up such habits. "Early to bed and early to rise," is the motto for health. The customs of society may sometimes require morning sleep by preventing a due degree of night sleep. Thus the author, after lecturing, often finds his nerves so excited that, though he retires, the blood courses through his throbbing brain so as utterly to defy sleep, and he may as well write while this fever lasts, to compensate for which he is obliged to sleep mornings, which, however, he never does at home. The fact is, that lectures and public meetings should be held daytimes instead of evenings.

129. PROMOTION.

But some cannot obtain sleep enough. This is partially true of the author, especially after lecturing and writing. Any preternatural excitement of the brain and nervous system prevents a due supply of this commodity. So do mental troubles, over exertion, disordered stomachs, and disease of any kind. In all these and kindred cases, sleep should be promoted. This can be done by previous PREPARATION. As, to enjoy our meals, we must first become hungry, and also prepare them, so we should sharpen up our sleeping appetite, and also prepare ourselves, mentally and physically, for this delightful repast and grand restorer of exhausted energy. This can be facilitated by a due degree of action, especially muscular. To overdo causes wakefulness, yet a due quantity of muscular exercise every day of our lives is eminently promotive of refreshing sleep at night. And those who would enjoy sleep must exercise. Especially those whose wakefulness is caused by nervous or cerebral excitability. Become comfortably tired, and you are prepared for refreshing sleep.

Such should also avoid excitement, and seek quiet in the evening before retiring. In short, reduce that cerebral action which keeps you awake, directions for doing which will be given hereafter.

The wakeful should especially go to bed soon after becoming drowsy, else they become extra wakeful, and remain so perhaps much of the night. This direction is particularly important. Yet going to bed only to lay awake, or before we are prepared for sleep, is also bad. We should try to go to sleep as soon as possible after going to bed.

Amusements, if of a pleasing, soothing kind, also promote sleep. Especially domestic amusements, as playing with children, conversing with friends, and the like. But exhilarating, exciting amusements intercept sleep. Especially promotive of sleep is a quiet, happy frame of mind, while unpleasant feelings, especially anger, retard it, so that the former should always be cultivated, and the latter avoided, both in ourselves and in children. "Let not the sun go down upon your wrath," is doubtless founded in this physiological law.

Hence, to induce children to have a good play or frolic just before going to bed, is an excellent practice.

Religious contemplations and devotional exercises are especially promotive of sleep. They diffuse over the soul a delightful quiet, a heavenly calmness, which invite sleep. A physician once directed a wakeful patient to THINK ON GOD, when he would go to sleep but could not, and the patient said that for forty years, whenever wakefulness returned, following this prescription soon lulled him to sleep. Family devotion induces a similar preparation.

Moderate fasting promotes sleep, while a full stomach retards it. The English think differently and eat on retiring; but if a full stomach facilitated sleep, we should become hungry when we became sleepy, whereas sleep diminishes appetite. In fact, we eat the less when we sleep abundantly, and the more the less we sleep.

Invalids, and the sick in particular, require to sleep much. As a restorative means, medicines bear no comparison with sleep. Hence, wakening the sick to give drugs is consummate folly. Nor is there a better sign of a favorable turn of disease than disposition to sleep, provided it be natural. A state of mere stupidity is a bad sign, but this differs materially from natural sleep.

Invalids and the wakeful should also guard assiduously against being disturbed when once asleep, till fully rested, on pain of subsequent wakefulness. Many weakly mothers have ruined their health and lost their lives by crying children. Yet that they can so train them as to sleep soundly all night, from infancy to maturity, will be fully shown in the author's work on "Maternity." See also [490].

A day nap is also most excellent for invalids, children, and all who do not or cannot obtain sleep enough during the night. A mere doze is to such most refreshing. If you cannot get to sleep the first few times, keep trying till you can, and you will soon form the habit. And even when you do not lose yourself, the rest will be beneficial.

The best posture for promoting sleep is doubtless recumbent on the back, because it facilitates respiration. Laying wholly

on either side often causes the internal organs and even brain to sag and remain more on that side, which is evidently injurious. Habituate children to sleep on the back, and if on either side, also on both.

A slight elevation of the head may be beneficial, yet habit aside, the horizontal posture for both head and body is probably the best.

130. BEDS AND BEDDING.

On what should we sleep? Something HARD. Mattresses are preferable to feathers because not so hard as to give pain, nor so soft as to enervate. Nor are straw beds any too hard. Feather beds are decidedly unwholesome, especially in summer. Being animal matter, they are subject to decay, and hence their unpleasant odor, which of course vitiates the air and breeds disease. They are also relaxing and weakening. Sunk into a pile of feathers, perspiration cannot escape, sleep is disturbed and does not refresh, and we awaken with a headache, feel prostrate, and unfitted for pleasure or business. Not so with mattresses. Of these, those made of cotton are doubtless the best. Mr. Ellsworth, in his patent report, says they are "the cheapest, most comfortable, and most healthy material for bedding known to the civilized world. Vermin will not abide in them: unlike hair and wool, they contain no grease, do not become stale or acquire an unpleasant odor like feathers, besides being in many cases medicinal—raw cotton worn on parts affected with rheumatism being known to be one of the best and most effectual cures." He also considers them as cheap again as any other kind, as seen in the following estimate:—

Cost of	Hair	Mattress	at 50c.	pr.	lb.	30a40 lbs.	from 15 to	$20
"	Wool	"	30c.	"	"	cost	" 11 to	12
"	Feathers	"	30c.	"		40		12
"	Moss	"	—	"	"	"	"	12
"	Cotton	"	30c.	"	8c.	with cost of ticking, at 12½ cts. per yard, labor, thread, etc.		$6 65

The habit of sleeping under a stack of bed-clothes is also equally as pernicious as a superabundance of clothes by day. They prevent sleep and retain about the body all the corrupt

effluvia it throws off, and which should be allowed to escape. None should sleep cold, yet all should habituate themselves to as little as possible and keep comfortable. And during the day, these clothes should be thrown upon the backs of chairs and thoroughly aired in a draft till towards evening,

The practice of covering up the head under the bed-clothes is most pernicious. Almost as well not breathe at all as to breathe over and over again the same fœtid air[101].

SECTION VI.

THE GLANDULAR SYSTEM, AND ABSORBENTS.

131. NECESSITY AND STRUCTURE.

As important a portion of the human structure as this deserves a passing notice, yet we shall not dwell. Of the general function of some of the larger glands, as the salivary glands, liver, pancreas, messentary, etc., mention has already been made. Their respective functions are indispensable to life, as is the action of the kidneys in secreting from the arterial blood that urea manufactured in the process of life, the superabundance of which arrests the vital process.

These glands are formed, somewhat like the lungs, with two sets of capillary vessels, the one for the ramification of blood, and the other for secreting their respective materials. The accompanying engraving furnishes a faint illustration of the arterial structure of a gland. Both the venous and secretory structures are similar, all their respective ramifications being almost infinitely minute.

The various secretions made in these glandular ramifications are emptied into ducts, and these into one another till all are emptied into one common reservoir and carried to their place of destination.

132. THE INTER-RELATION OF THE GLANDULAR SYSTEM AND MIND.

Though all parts of the system reciprocate their several conditions with all the others, yet this reciprocity seems to be

No. 15. The Structure of a Gland.

more intimate between the glandular functions and the cerebral than between any of the others. Every change and phrase of mental action produces a corresponding change in the glandular action. Thus, thinking of food "makes the mouth water," that is, excites a copious secretion and discharge of the salivary glands; sadness retards, and pleasurable emotions augment the action of the liver; the former accelerating and the latter preventing digestion; grief provokes a copious secretion of the lachrymal glands in the form of tears, and sudden joy sometimes has a similar effect; and thus of the others. But the most conspicuous illustration of this principle will be found mentioned in "Love and Parentage," and applies to the secretion employed as the messenger of life.

The great practical lesson taught by this reciprocity is the importance of keeping the mind in that calm and happy frame which promotes glandular secretion, and thereby health.

133. THE ABSORBENTS

Also deserve notice in this connection. They are stationed throughout the entire system for the double purpose of taking up foreign matters, such as biles and other tumors which do not come to a head, and also any deposites of fat which may be found in the system when wanted by it. The fat of the body is only a deposite of its surplus carbon, stored up against

a time of want. When imperfect digestion or a deficiency of food renders the supply of carbon unequal, for the time being, to the demand, these absorbents take up this fat and empty it into the chyle-duct and so into the circulation, and hence the falling away of the sick or starving. When this fat or store of carbon is exhausted by protracted hunger or stomatic disease, these absorbents take up even muscle and cellular tissue and empty them also into the circulation, and hence the extreme emaciation of the starving, of consumptives, dyspeptics, and the sick generally. This provision against any deficiency of nutrition is inimitably beautiful and useful.

CHAPTER IV.

LOCOMOTION—ITS APPARATUS AND NECESSITY.

SECTION I.

THE OSSEOUS SYSTEM.

134. THE EXPENDITURE OF THE VITALITY.

THUS far we have seen by what instrumentalities vitality is supplied. Yet all this ingenious arrangement for its supply would have been useless but for some means for effecting its expenditure. This vitality may be considered the raw material of life—the stock in trade of the mechanic. It next requires to be WORKED UP into the various ends of life or it will avail nothing. For this expenditure nature has made provisions quite as ample as for its supply. This expenditure consists in two things, motion and the mentality, sensation included. To subserve these two ends the entire human structure, the inimitably beautiful vital apparatus included, was created. Without motion, man must always have remained in one place, like the oyster, and been incapable of speaking, eating, or doing a single thing, and without mind and sensation he would have been incapable of experiencing one single emo-

tion of pleasure or pain. But behold and admire the number and variety of functions effected through their instrumentality! In fact they embody all the ends of his being.

To effect these great ends, organs adapted thereto are necessary. These organs consist of the osseous, muscular, nervous, and cerebral systems, to the discussion of which our subject thus brings us.

135. THE OSSEOUS SYSTEM—ITS NECESSITY AND STRUCTURE.

As but for the timbers of buildings nothing would support their superstructure, so, but for some kindred frame-work within the body both to keep the various organs in place, and to form, as it were, timbers or fulcrums for the attachment of the muscles, motion would be impossible; and the first provision of a motive apparatus consists in devising these supporting timbers. With such a provision nature has furnished the human body in the form of BONES. With their general appearance all must be familiar. They are composed principally of two substances, animal and earthy, into the latter of which lime and phosphorus enter—the former imparting life, and the latter firmness. In youth the animal predominates, and hence the greater flexibility of young bones. This also prevents fractures, aids to break the falls of children, and facilitates growth, it being the first part of the bone formed, as seen in the tender cartilage of chicken bones. But as age advances, the earthy materials of bones predominate over the animal, because the muscles, having become stronger, require augmented stiffness to prevent their bending, and because experience enables us to guard against falls. As the earthy predominates the bones become more and more brittle—and hence the greater frangibility of the bones of the aged—till, in a certain disease which consumes their animal matter, they break from slight strains; whereas in another disease which consumes their earthy matter, but leaves their gelatinous, they can be bent any way, and even tied up in knots without breaking; yet in this case motion is impossible. These bones are also ramified with blood-vessels and nerves, the former to supply growth and vitality, and the latter to impart sensation.

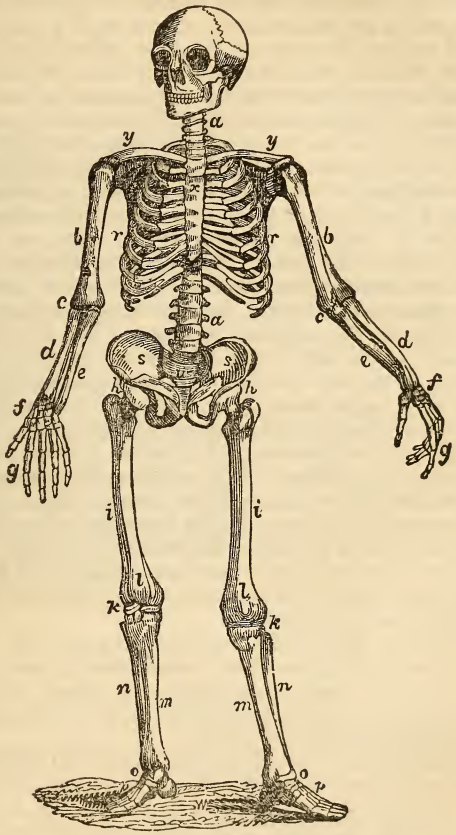
But these bones are not formed in one solid, continuous stick, but number about 252, united by joints, and held together by powerful ligaments. At these joints, the bones enlarge, and become spongy—though the weight of their ends is not greater than of their middle portions—which, together with an elastic plating between them serves to deaden the blows of a fall or jump upon the feet, so that, before it reaches the brain, it is comparatively obviated, and that delicate structure saved from contusion. Throw 200 pounds down ten feet—a distance we often jump—and see how hard it strikes. Not so with man. A membrane is also stationed at each joint to secrete an oleaginous substance more slippery than oil, to lubricate these joints, and prevent their wearing out by the powerful and almost perpetual friction occasioned by muscular contraction and the weight of the body, and to facilitate the ease of motion.

Besides those powerful cords which tie the bones together at their joints, so as to resist their tendency, when the muscles contract powerfully upon them, to slip past each other, as in sprains and dislocations—the evils of which some of us may have experienced—they are fitted into one another in the form of HINGES—a ridge in one exactly fitting to a corresponding depression in the other—and of BALL AND SOCKET joints, as in those of the hips and shoulders, where a ball in one fits exactly into a socket in the other, so as to allow motion in all directions.

These bones are not scattered about at random, but similarly formed bones are always found in similar positions, exactly fitted to subserve their respective ends. Thus attached they constitute the human SKELETON or framework of the body, as represented in the accompanying engraving, which, with the description is copied from A. Combe.

"The TRUNK, as will be seen from the annexed cut, consists of the SPINE *a a*, the RIBS *r r*, the STERNUM *x*, and the PELVIS *s s*. The spine, vertebral column, or back-bone *a a*, which supports all the upper parts, is a very remarkable piece of mechanism. It is composed in all of twenty-four separate bones, called VERTEBRÆ, from the Latin word VERTERE to turn, as the body turns upon them as on a pivot. Of these, seven, called CERVICAL vertebræ,

belong to the neck; twelve, connected with the ribs, and called DORSAL, to the back; and five, called LUMBAR, to the loins. The base of the column rests on the SACRUM *w*, which is closely com-



No. 16. THE SKELETON.

pacted between the bones of the pelvis *s s*. The vertebræ are firmly bound to each other in such a way as to admit of flexion and extension and a certain degree of rotation, while, by their solidity and firm attachment to each other, great strength is secured. Some conception of this strength may be formed, when we consider the enormous loads which some athletic men are able to carry on their shoulders, or raise in their hands; the whole weight of which is necessarily borne by the vertebræ of the loins. As the space oc-

cupied by the abdomen gives large outward dimensions to this region of the body, it is only upon reflection that we perceive that the whole force exerted by the human frame in its most strenuous efforts centers in the bony column we are now examining.

"While the smooth or rounded forepart or BODY of the vertebræ affords support to the superincumbent parts, the projecting ridge behind, and rugged processes at the sides, combine with it to form a large tube or canal, extending from the top to the bottom of the column, and in which the spinal marrow is contained and protected. Between each of the vertebræ a thick compressible cushion of cartilage and ligament is interposed, which serves the triple purpose of uniting the bones to each other, of diminishing and diffusing shocks received in walking or leaping, and of admitting a greater extent of motion than if the bones were in more immediate contact.

"The ribs *r r*, twelve in number on each side, are attached by their heads to the spine, and by their other (cartilaginous) extremities to the STERNUM or breast-bone *x*. The seven uppermost are called true ribs, because each of them is connected directly with the sternum, by means of a separate cartilage. The five lower ribs are called FALSE, because one or two of them are loose at one end, and the cartilages of the rest run into each other, instead of being separately prolonged to the breast-bone. The use of the ribs is to form the cavity of the chest for the reception and protection of the lungs, heart, and great blood-vessels, and to assist in respiration by their alternate rising and falling. This action enlarges and diminishes by turns the size of the chest and the capacity of the lungs.

"The PELVIS *s s*, is formed by the broad flat bones which support the bowels, and serve for the articulation of the thigh. A general notion of their appearance and uses may be obtained from inspection of the cut, which, however, does not represent with perfect accuracy the minuter structure.

"The bones of the UPPER EXTREMITIES are, the SCAPULA or shoulder-blade; the CLAVICLE or collar-bone *y*; the HUMERUS or arm-bone *b*; the RADIUS *d*, and ULNA *e*, or bones of the forearm; and the small CARPAL and METACARPAL bones *f* and PHALANGES *g*, forming the wrist, hand, and fingers.

"The SCAPULA is the broad flat bone lying at the upper part of the back, familiarly known as the shoulder-blade, and so troublesome to many young ladies by its unseemly projection. It serves to connect the arm with the trunk of the body, and gives origin to many of the muscles by which the former is put in motion. The COLLAR-BONE *y*, extends from the breast-bone outwards to the scapula. Its chief use is to prevent the arms from falling forward in front of the body; and hence it is wanting in the lower animals, whose superior extremities are much closer to each other than those of man.

"The HUMERUS or arm-bone *b* is adapted by a kind of ball and socket joint to a corresponding surface in the scapula, and hence enjoys great latitude of motion, and, from the shallowness of the receptacle, is somewhat liable to dislocation. The RADIUS and ULNA *d e* constituting the forearm, are connected with the humerus by a

hinge-like joint, which admits readily of flexion and extension, but not of rotation; and as the articulation is of a peculiar construction, it is rarely dislocated. The movements of pronation and supination, or turning round the hand, are effected, not by the elbow joint, but by the radius *d* moving upon the ulna *e*, by means of joints formed for this purpose. The wrist and finger-joints are too complicated to admit of explanation here.

"The lower extremities consist of the OS FEMORIS or thigh-bone *i*; the PATELLA or knee-pan *l*; the TIBIA *m*, and FIBULA *n*, or leg bones; and the TARSAL and METATARSAL bones *o*, and PHALANGES *p*, composing the ankle, foot, and toes.

"The thigh-bone *i* is articulated by means of a large round head deeply sunk into a corresponding hollow in the pelvis at *h*; freedom of motion being thus combined with great security. The thigh may be moved backwards and forwards as in walking; and also outwards and inwards, as when sitting on horseback, or with the legs crossed. The socket being much deeper than that of the shoulder-joint, the thigh-bone has not the same range of motion as the humerus, but it has proportionally greater security.

"The PATELLA or knee-pan *l* is well known. It is a small bone constituting the projection of the knee. It increases the power of the muscles which extend the leg, and protects the front of the knee-joint. The TIBIA *m* is the principal bone of the leg, and is the only one articulated with that of the thigh. Its lower end forms the projection at the inner ankle. The FIBULA *n* is the long slender bone at the outer side of the leg, the lower end of which forms the outer ankle. The TIBIA and FIBULA both contribute to the formation of the ankle-joint, which, like that of the knee, is almost limited to flexion and extension."

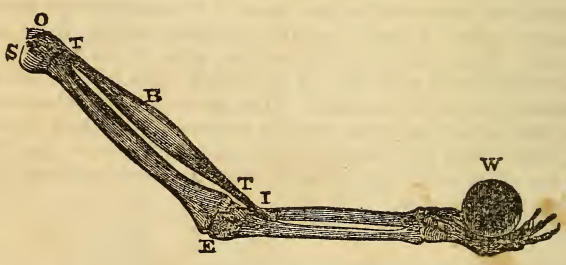
SECTION. II.

THE MUSCLES—THEIR NECESSITY, STRUCTURE, FORMATION, AND EXERCISE.

136. NECESSITY, STRUCTURE, AND OFFICE.

YET this beautiful structure of bones and joints every way so perfectly adapted to serve as a foundation for the motive apparatus, would be as inert as so many sticks but for something like ROPES and PULLEYS to put them in motion. These means are supplied by MUSCLES. They lie beneath the skin, upon and around the bones, and constitute the red meat of animals and man. Every human being is endowed with some 527, of all required shapes and sizes, exactly adapted to produce those

innumerable and most powerful motions of which man is capable. They over-lap, under-lay, and interweave each other in all conceivable ways, and are inclosed in a smooth peritoneal membrane which allows them to slide upon each other without friction ; else their powerful contraction would soon wear them into shreds. They are composed of innumerable strings or fibres bound together into one common bundle, the contracting or shortening of which results in motion. Indeed, this contractile power constitutes their sole function, and is effected by an expenditure of vital force. And as one end of these several muscles is attached to one bone and the other to another across a joint, this contraction moves one or the other of these bones, and of course produces motion. This is illustrated more fully in the accompanying engraving and description.



No. 17. The Muscles of the Arm.

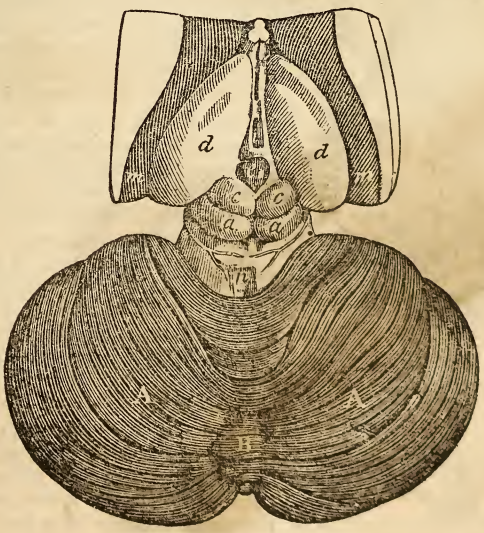
The figure represents the bones of the arm and hand, having all the soft parts dissected off, except one muscle O B I, of which the function is to bend the arm. O the origin of the muscle. B the belly. I the insertion. T T the tendons. S the shoulder-joint. E the elbow. When the belly contracts, the lower extremity of the muscle I, is brought nearer to the origin or fixed point O, and by thus bending the arm at the elbow-joint, raises up the weight W placed in the hand.

These muscles are largest in the middle—the part which contracts and taper off into tendons—those strong cords seen in the wrists, back of the hands, insteps, and above the heels, so that many muscles may be attached to a single bone, else the size of the bones must have been bunglingly large. The strength of these cords is tested by hanging slaughtered ani-

mals up on sticks thrust under these tendons, and also by the tenacity with which they adhere to the bones, as well as by our ability to stand on one foot and toss the body about by one of these tendons—that of Achilles at the heel. Their attachment is formed on processes or ridges in the bones, or on their heads near joints, which processes are the larger the more powerful the muscles.

Single motions are generally effected by the contraction of individual muscles. But most of our motions are compounds of several, effected by many bones, joints, and muscles acting in concert. Thus the simple lifting of the hand to the head is effected by the combined motions of the wrist, elbow and shoulder; and in walking, apparently so easy, nearly all the muscles and bones of the body are brought into requisition; so much so that even the tying of the hands greatly impedes it.

Many of the motions of the body, as climbing, leaping, lifting, etc., require the CONCERTED as well as powerful action of every muscle of the body. This concert is probably effected by means of a cerebral organ of motion located in the cere-



No. 18. LOCATION OF THE CEREBRAL ORGAN OF MOTION.

bellum in the middle line of the head at the nape of the neck, at B. of the foregoing engraving: A, representing the cerebellum, and *a a*, *c c*, *d d*, the junction of the spinal nerve with the brain. Indeed, all the internal organs, heart, lungs, liver, etc. undoubtedly have each their cerebral organs, just as the stomach operates by means of Alimentiveness.

Some of these muscles and their manner of producing their respective motions are seen in the accompanying engraving and description copied from Combe.

No. 19. THE MUSCLES.

"To understand the uses of the various muscles, the reader has only to bear in mind that the object of muscular contraction is simply to bring the two ends of the muscle, and the parts to which they are attached, nearer to each other,—the more movable being always carried towards the more fixed point. Thus when the STERNO-MASTOID muscle *f g* contracts, its extremities approximate, and the head, being the movable point, is pulled down and turned to one side. This may be easily seen in the living subject, the muscle being not less conspicuous, than beautiful in its outline. Again, when the powerful RECTUS or straight muscle *b* on the front of the thigh contracts with force, as in the act of kicking, its lower end attached to the knee-pan and leg, tends to approximate to the upper or more fixed point, and pulls the leg strongly forwards. This occurs also in walking. But when the SARTORIUS or tailor's muscle *c* is put in action, its course being oblique, the movement of the leg is no longer in a cross direction, like that in which tailors sit; and hence the name SARTORIUS.

"Another variety of effect occurs, when, as in the RECTUS or straight muscle of the belly *i i*, sometimes one end and sometimes both are the fixed points. When the lower end is fixed, the muscle bends the body forward, and pulls down the bones of the chest. When, as more rarely happens, the

lower end is the movable point, the effect is to bring forward and raise the pelvis and inferior extremities; and, when both ends are rendered immovable, the contraction of the muscle tends to compress and diminish the size of the cavity of the belly, and thus only assists the natural evacuations, but co-operates in the function of respiration.

"In contemplating this arrangement, it is impossible not to be struck with the consummate skill with which every act of every organ is turned to account. When the chest is expanded by a full inspiration, the bowels are pushed downwards and forwards to make way for the lungs; when the air is again expelled, and the cavity of the chest diminished, the very muscles *i i i*, which effect this by pulling down the ribs contract upon the bowels also,—pushing them upwards and inwards, as can be plainly perceived by any one who attends to his own breathing. By this contrivance, a gentle and constant impulse is given to the stomach and bowels, which is of great importance to the min contributing to digestion and in propelling their contents; and one cause of the costiveness, with which sedentary people are so habitually annoyed, is the diminution of this natural motion in consequence of bodily inactivity."

137. THE POWER OF THE MUSCULAR SYSTEM.

The number, variety, and power of the motions capable of being produced by these muscles are indeed most wonderful, as all have seen and experienced. They enable us to climb the lofty tree, and even the smooth pole of liberty—to mount the towering mast, and not only support ourselves in the rigging of the ship, but to put forth great muscular exertion while she is tossing and rolling, and that in the midst of the hurricane. Standing upon our feet, we can toss our bodies—weighing from 100 to 200 pounds—several feet upward and forwards, and in all directions for many hours in succession, as in dancing and the circus. Or we can transport it fifty or sixty miles between sun and sun, and even carry many pounds weight upon our backs. Or we can chase down the fleetest animal that runs. Or we can labor briskly every day, for scores of years. Or we can lift and carry several times our own weight. Or we can accomplish a multiplicity of powerful and protracted bodily exertions and do a variety and amount of things almost without end.

"The muscular power of the human body is indeed wonderful. A Turkish porter will trot at a rapid pace, carrying a weight of six hundred pounds. Milo, a celebrated athlete from Crotona,

accustomed himself to carry the greatest burthens and by degrees became a monster in strength. It is said that he carried on his shoulder an ox, four years old, weighing upward of one thousand pounds, for above forty yards, and afterward killed it with one blow of his fist. He was seven times crowned at the Pythian games, and six at the Olympian. He presented himself the seventh time, but no one had the courage to enter the lists against him. He was one of the disciples of Pythagoras, and to his uncommon strength the learned preceptor and his pupils owe their lives. The pillar which supported the roof of the school suddenly gave way, but Milo supported the whole weight of the building and gave the philosopher time to escape. In his old age Milo attempted to pull up a tree by its roots and break it. He partly effected it, but his strength being gradually exhausted, the tree when cleft, reunited, and left his hand pinched in the body of it. He was then alone, and, being unable to disengage himself, died in that position.

"Haller mentioned that he saw a man whose finger being caught in a chain at the bottom of a mine, by keeping it forcibly bent, supported by that means the weight of his whole body, one hundred and fifty pounds, until he was drawn up to the surface, a height of six hundred feet.

"Augustus XI., King of Poland, could roll up a silver plate like a sheet of paper, and twist the strongest horse-shoe asunder.

"A Frenchman who was attached to Rockwell & Stone's Circus last spring, was able to resist the united strength of four horses, as was witnessed by hundreds in New York, and other places. A lion is said to have left the impression of his teeth upon a piece of solid iron.

"The most prodigious power of muscle is exhibited by fish. The whale moves with a velocity through the dense medium of water that would carry him, if continued at the same rate, round the world in little less than a fortnight; and a sword-fish has been known to strike his weapon quite through the oak plank of a ship." —*Western Literary Messenger.*

The following, bearing on this point, is taken from a Scotch paper, and is headed, "The last of the Stuarts." It is, withal, an excellent hereditary fact, and shows that the Stuart family were most remarkable for great physical strength, which harmonizes with the principle that all distinguished men are both from strong-constitutioned and long-lived families; he being now one hundred and fifteen years old.—"Hundreds of persons can bear testimony to his amazing strength, from which circumstance he got the bye-name of 'Jemmy Strength.' Among other feats he could carry a twenty-four pounder cannon, and has been known to lift a cart-load of hay, weighing a ton and a half, upon his back. Many a time has he

taken up a jackass, and walked through the toll-bar, carrying it on his shoulders. It will be long before we can look upon his like again, to hear of his stories of 1745, and his glowing descriptions of the young Chevalier."

Jonathan Fowler, of Guildford, Conn., walked out knee deep through the mud, oyster-shells, and filth of a sea shore at low tide, to a shark left by the retiring tide in a pool, captured it while yet alive, though it was weakened by having but a scanty supply of water, shouldered it, and brought it alive on his back to the shore, which weighed five hundred pounds!—quite a load, considering that it was not the most portable of articles, nor the best of roads. The feats of the Ravel family, Bedouin Arabs, and circus performers are also in point

Nor are these and kindred exhibitions of strength by any means the ultimatum of man's muscular capability. A due degree of TRAINING would enable him to accomplish much more. We are but lilliputians in comparison with what mankind will yet become. Most exalted are my ideas of man's muscular powers. I believe he might vie with the lion himself as to absolute strength, and carry heavier burdens than horses. Indeed, Turkish porters now transport six and eight hundred pounds at a time on their backs with ease, and the Belgian giant could stand up under TWO TONS. The Chinese have no horses, and carry their teas and silks between two men hundreds of miles on their backs! If man can effect all he now does without either muscular discipline or the application of the laws of hereditary descent, how much more with? The human race is yet in its teens in everything,* muscular capability included. We little realize the extent to which this capability can be carried IN OUR OWN SELVES, if properly disciplined. This brings us to consider

138. THE IMPORTANCE OF EXERCISE.

Nor was this motive apparatus, so perfect, so powerful, created to lie dormant, but to be USED. Almost innumerable

* See a series of articles in the American Phrenological Journal, entitled "Progression a law of things." in Vols. VII, VIII, and IX.

arrangements in nature COMPEL such exercise. Thus man is ordained to exercise his muscles in tilling the soil, in order to procure food; in changing his position and moving from place to place; in making and working machinery, using tools, building, printing, making that vast variety and quantity of articles of clothing, furniture, ornament, and all the innumerable things used by mankind, and even in reading, writing, eating, walking, talking, looking, breathing, and all those millions of ends—great, little, and almost infinitely diversified—requiring locomotion, which every member of the human family is compelled to put forth continually through life.

We have already seen the importance of digestion, circulation [82], respiration [85], perspiration [104], and sleep [126], all of which exercise promotes. Who has not seen his veins become prominent and hardened during vigorous exercise on account of the increased passage of blood through them; whereas this swelling appearance of the veins, is never found in the indolent, except in fevers. Who does not know that a smart lift, or work, or run, or vigorous exercise of any kind, increases the frequency and power of the pulse as well as the rapidity and volume of the inspirations? That it equally accelerates the perspiration all are witnesses. Who has not seen the sweat run down in streams from all parts of the body during hard labor? And who does not know how much more heartily we eat, and sweetly and soundly we sleep with than without labor? Nor is there an important function of our nature which muscular exercise does not promote, and inaction intercept. By enhancing respiration it augments the amount of oxygen [86] and carbon [92] consumed, as well as of fibrine, glutine, and casseine consumed, indeed of all the materials derived from food and breath, and also greatly increases the expulsion of all noxious matter from the system in the form of phlegm, perspiration, and respiration. Besides hurrying the circulation by increasing the introduction of oxygen [89], it still farther increases the flow of blood by urging it along through the veins; for the contraction of the muscles upon the veins, urges their contents forward—backward it cannot go [90]—towards the heart. Labor also quickens the action of the

bowels and of the digestive process generally [77]. These functions, constituting no small portion of life itself, labor enhances and thus augments life and all its pleasures and powers. In short, muscular action promotes every function and power, mental and physical, of our entire nature, besides being indispensable to all. He who does not work can therefore enjoy only a lower degree of life and its pleasures, muscular inaction deteriorating, diseasing, and vitiating the entire man and woman. Nature still farther recommends muscular action by the

139. PLEASURES OF EXERCISE AND LABOR.

Since obedience to her laws occasions pleasure [7], and since muscular exercise is thus undoubtedly one of her laws, we might expect it to be freighted with a great variety and amount of ENJOYMENT. And thus experience proves it to be. Confine yourselves, or even sit or lie, in one position all day, and you will find such inaction to be exceeding painful. See how animals, on breaking away from close confinement, run and skip, and hop, and frisk as though they did not know how to contain themselves. How many times, after having remained inactive for some time, on going out have you been filled with an amount of pleasure in action better felt then described. Nor is it till after our muscles have been drilled long and severely, and even become enfeebled, if not diseased, by inaction, that we can keep still without pain. Idleness is unnatural. Action is natural and pleasurable in its very nature. See how much real pleasure children take in playing and running—so much that they race from morning to night, and cannot be kept still by any means whatever. How much pleasure a smart walk, or ride, or dance, and the like afford? Nor do the sedentary realize how much pleasure is to be taken in MANUAL LABOR—it being excelled only by that taken in eating, breathing and sleeping. Indeed, those who do not work or take vigorous exercise in some way, can experience but little pleasure in life; for they can neither eat, nor sleep, nor breathe, nor think, nor feel with that real RELISH so essential to enjoyment. "He that will not work, neither shall he eat," is written quite as legibly on the physiological con-

stitution of man as in the Bible, labor being indispensable to appetite, and this to the enjoyment of food, besides the far greater amount of food which nature allows him who works to eat with impunity. Nor should the laborer envy the rich their ease or their dainties; for he has "meat to eat which they know not of," luxuries of which they can never partake, till they create a relish for them by laboring like him. For one, I would as soon forego the pleasures of appetite or rest as of manual labor. I say labor, because, though walking, riding, hunting, bowling, dancing, and other kinds of exercise are better than none, yet none of them compare with WORK as a means of promoting health. No form of play, no other kind of exercise, at all compares with LABOR, especially AGRICULTURAL, for expanding and strengthening the chest, developing all the organs, and thoroughly exercising every muscle and organ in the body. Better ride, or walk, or dance, or play ball, and the like, than nothing; but better work than either or all. To derive the pleasure from muscular action it is capable of imparting, we must DO something—must effect some useful END. Exercise for its own sake is comparatively insipid; but when we are achieving some useful end both its utility and its pleasures are redoubled. You may play, but let me WORK. Give me an axe, or saw or hoe, or scythe, or rake, or shovel, or some kind of tool, and place to use it, and I envy you not the pleasures of even the dance and hunt. Let me plow, and plant, and raise food for my table, and set out and tend trees that I may enjoy their fruit, and add to the products of the earth, and thereby to the aggregate of human happiness. God has told man PRACTICALLY to till the earth and keep it, and that he must eat his bread by the sweat of his brow. Not by any means, as generally interpreted, that such toil is a curse. So far therefrom, it is a BLESSING, and one of the greatest pleasures of earth. Nor is labor ever a curse, or other than one of nature's greatest LUXURIES except when excessive in amount or ill-timed. Nor can words portray the evils consequent on the false notion that labor is a curse, of which presently. Indeed, if our world produced all we require spontaneously, without any requisition for

human labor, it would hardly have been worth living in. If these views of the utility of labor require confirmation they have it in the fact that

140. MOST GREAT MEN LABORED HARD IN YOUTH.

What distinguished man in this country or age, or any other, but took a great amount of exercise while young? And most of the world's geniuses were brought up to HARD WORK. Adam Clarke was noted, when at school, for his great physical strength in rolling stones. Shakespeare, while composing his immortal plays, carried brick and mortar to build places for their performance. John Wesley rode and walked a great many thousand miles, and it was this habitual exercise which prepared his gigantic intellect to put forth those mighty efforts which enabled him to do so much good, and which must immortalize his name. Elihu Burritt, probably the greatest scholar of the age, was compelled by necessity to work EIGHT HOURS DAILY at the anvil in order to furnish himself with the means of prosecuting his intellectual labors; and it was this fact of his thus laboring daily, which enabled him thus to take such astonishing strides in the acquisition of knowledge. Clay was a poor boy, and actually worked for a living. Henry Bascom, the great western orator, travelled west ON FOOT, with his axe on his shoulders. The old Roman and Grecian orators took a great amount of exercise in order to prepare themselves for public speaking, and they put in practice one fundamental principle of which we moderns, with all our boasted light and inventions, have lost sight—that of strengthening the voice by gymnastic exercises.* Sir Walter Scott,† after confining himself to his desk for several days, till the energies of his brain had become exhausted, would mount his horse, call out his dogs, and follow the chase for days in succession, till he had restored his prostrated energies, and

* No one can have a good voice without having a good muscular system; and, hence, to improve the tone of the latter, will augment the power of the former. Hence, an additional reason why public speakers should labor.

† Madden's Infirmities of Men of Genius.

then returned to his study. When Byron entered college, fearing that his tendency to corpulency would injure his personal beauty—of which he was very proud—he took extremely severe exercise daily in order to reduce it, besides leading an extremely abstemious life. Webster was a backwoodsman, born in a "log-cabin," on the borders of the unbroken forest, and inured to hard labor.* And often, breaking away from public life, and shouldering his gun, he ranges the forests for days in search of game, besides taking much exercise daily. Franklin, the beacon-star of his profession, was a practical printer and a hard worker. Patrick Henry, that unrivalled star of genius and eloquence, labored on the farm while young, and was passionately fond of music, dancing, and the chase, the latter of which he often followed for weeks together, camping out in true hunter's style.† Need we mention the Father of our country, its pride and pattern? Washington, when not employed by his country, labored assiduously upon his farm; and was actually driving his plough when he received the news of his election as President. Harrison, "the FARMER of North Bend," led a life of great physical exertion and exposure. Burns, the Scottish bard, actually composed much of his poetry when at work on a farm. President Dwight, the great theologian and scholar, attributed much of his mental vigor to daily labor in his garden. John Quincy Adams, one of the most learned men of the age, says he finds much daily exercise indispensable.

Both while in college, and during my professional visits to our principal colleges since my graduation, I have observed

* See his speech at Saratoga Springs, in 1844.

† After his removal to Louisa, he has been known to hunt deer, frequently for several days together, carrying his provision with him, and at night encamping in the woods. After the hunt was over, he would go from the ground to Louisa court, clad in a coarse cloth coat, stained with all the trophies of the chase, greasy leather breeches, ornamented in the same way, leggings for boots, and a pair of saddle-bags on his arm. Thus accoutred, he would enter the courthouse, take up the first of his causes that chanced to be called; and if there was any scope for his peculiar talent, throw his adversary into the background, and astonish both court and jury, by the powerful effusions of his natural eloquence.—*Wirt's Life of Patrick Henry.*

as a uniform fact, that those students who have been brought up without having labored, never take a high intellectual stand, except in parrot-like scholarship. They always show a want of mental vim and pith, and the powers of close, hard thinking. After they enter upon the business of life, their case is still worse. For them to rise to eminence is impossible. O, I thank God and my father that I was obliged to WORK hard and constantly on a farm till sixteen years of age, when I began to prepare for college. Leaving home with only four dollars in the world, with my all upon my back, I travelled four hundred miles, WORKED my way to college, and through college, and, instead of earning my money by teaching school, supported myself by sawing, splitting, and carrying up the wood of my fellow-students, THREE AND FOUR FLIGHTS OF STAIRS, improving in this way every hour, except study hours, and often portions of the night. My fellow-students laughed at me then, but now the scales are turned. I thought it a hard row to hoe, but a rich harvest has it yielded me; and you, reader, owe to this same cause, no small portion of whatever delight or benefit, my lectures, writings, and examinations may afford you. Even these very pages are penned after a delightful feast of work. And one of the means by which I am enabled to write as much as I do—how well it is done others must judge—is the interspersion of composition with labor. I rise in the morning before the hens leave their resting places, and engage briskly in some sort of labor, usually agricultural, till I have worked up the circulation to a high pitch, and sent the blood rushing around the system—in which manual repast I take more pleasure than even in my subsequent breakfast—and then go to my desk to put on paper the ideas which this bodily exercise pours in upon my mind. Merely as a means of promoting authorship alone, no motive would induce me to give up MANUAL LABOR,* nor has probably anything aided my authorship as much as the purchase of a small plot of ground on which to work.

* Some have expressed surprise at the amount of mental exertion put forth by the author. Whether it is remarkable or not, its secret is in exercise and fasting [68].

Nor has my health ever sustained as much injury from exposure, or excessive professional application, or any other cause, as from that deficiency of labor which some twenty years study and severe professional labor have partially prevented my taking. Nor has anything done more to restore the health thus impaired than a return to work. Pardon this personal allusion, but profit by the lesson it teaches. Reader, be your occupation what it may, pleasure or business, mental discipline or professional attainments, take this advice—WORK HARD AND DAILY FROM TWO TO SIX HOURS—and you will accomplish more study, dispatch more business, and perform and enjoy more in whatever you engage, ten to one, than by perpetual application. As the bow always bent loses its elasticity, so continued application either exhausts or disorders the brain and impedes mental energy and discipline, which daily labor will wonderfully promote. Ye who aspire after renown, WORK. Ye who would do good, WORK. Ye who would fulfil man's great terrestrial destiny of being HAPPY, LABOR DAILY. And ye who are too proud or too lazy to work, be contented to suffer. Good enough for you because you violate a cardinal law of your being. This arraigns for condemnation

141. THE ANTI-WORKING DOCTRINE AND PRACTICE.

In view of these two fundamental laws of our being—the great demand of nature for muscular action, and its subserviency of all the great ends of life, what shall we say of those who are ABOVE work? Above it? Rather, BELOW it; for depend upon it, he who thinks himself too good to work, is in reality too BAD. No man or woman can ever be above labor without being above his nature and his God. Shall the Almighty Maker of all things not only work the six days of the creation,* but "from everlasting to everlasting," and shall man, "the work of his hands," be above his Maker? That human being is no man, no woman, only some paltry thing, who is too proud to engage in manual labor. "To till the earth and to keep it" is an honor, not a disgrace—is to be-

* Gen. ii. 2, 3.

come "co-workers with God," not a menial. And he or she who is too proud to labor, ought, in all consistency, to be too proud to breathe and eat, because the former is quite as much a constitutional function and demand of nature as the latter. Ashamed to be seen at work? As well be ashamed to look or talk! Away with this dogma that labor degrades. It elevates and ennobles. Its influence upon the mind is most beneficial. It begets a resolution and energy of character, which infuses into all our feelings and conduct an indispensable element of success. Labor requires a perpetual grappling with difficulties and overcoming of obstacles, which inspire and cultivate a firmness and determination imparted by nothing else. Hence the youth brought up to do no work while young, fails to cope with difficulties, but yields to them through life, and of course accomplishes little. This explains why rich youths make such poor scholars, and shiftless ninnies. Rather my boy would be a street scavenger, and my girls kitchen drudges, than brought up not to labor at all, for no kind or amount of work is as bad as either idleness or no labor. Not that I advocate excessive toil, of which presently, but SOME sort of work. Play is good for children, but not enough. They must learn, by toiling through those opposing obstacles the removal of which constitutes labor, to grapple in with all kinds of difficulties with that determined resolution which says in action "I can and I will," "get out of my way or I'll get you out." The greatest curse now impending over our land is this anti-working fashion. Parents seem to vie with each other who shall support their children at the greatest remove from doing anything. And one of the greatest of the evils of that monster evil slavery, is the idea it practically fosters and insists upon, that labor is the business of slaves, and degrading to master and son—the wrong inflicted on the slave, great as it often is, being trifling compared with the depravity and suffering which this anti-working tendency does so much to rivet upon the white population.

Yet all anti-workers have their reward. Produce me the man thus brought up, who did not turn out to be both inef-

ficient and vicious. This explains the prevalence of vice among the rich, and at the south, the fact of which is palpable. If I had the wealth of Astor my children should work. Not that I would force them to it, for this might make them hate it, but that I would persuade them to it, and enamor them of it, so that they should labor from choice.

And those dear, delicate, fashionable, city ladies—generally as homely as hedge fences, simply because they do not work, and of course become sickly, and therefore "ugly looking"—so extra exquisite that they must never soil their soft hands by doing the least thing about house—too nice, and delicate, and refined, and genteel, and senseless, besides much more, to be so vulgar—may possibly take a fashionable promenade once in a while, and an occasional "airing" in the easiest riding carriage that can be made. So very genteel, they must ride to church, though only two or three blocks off! Consummate simpletons; don't you wish you had a patent machine, by which your servants could chew your food and pump breath into you without any effort of your own, so as to place you at a still greater remove from labor! And your extra delicate and helpless children—don't you wish they could lay down and lie there all their lives, and save the trouble even of eating by letting pap drop into their open mouths and run down their tiny throats of itself!

And poor but proud pretenders to gentility, who have scarcely enough to eat, yet would fain make a genteel appearance—starving the kitchen to feed the parlor—if accidentally caught in kitchen habiliments, must blush, and apologize, and falsify outright by pretending that their servant has just left, and they had to prepare dinner—out upon your proud nothingness. Have to work, yet lie to hide it! This anti-working pride is contemptible in the rich, but in you, intolerable. Beg pardon for obeying the laws of your being, ha! What greater sign of littleness! Go away, ye toadstool grandees, into merited insignificance and infamy. Come, ye laborers, inherit the blessings conferred by toil. I do not wish such perverters of their natures had no muscles, but a short paralysis of them, so as to enforce their practical value,

would be good enough for them. Indeed, their partial paralysis always follows their protracted inaction. Muscles used but little decline till they become so weak that exertion, otherwise a source of exquisite delight, now becomes irksome, and fatigue follows trifling exercise. Such are most heartily to be pitied, yet their punishment is just and self-induced[7].

142. THE DIGNITY OF LABOR, AND RENDERING IT AGREEABLE.

In view of this constitutional demand for labor, what becomes of the idea that laborers are therefore inferior? Blown to atoms by a blast from nature's ordinances. The honorables of the earth are its laborers. Nothing is mean which nature requires, but on the other hand, worthy of universal commendation. What she has anointed and crowned let not man despise. This idea that labor is degrading had its origin in kingly and feudal times and institutions, of lordlings and serfs. Would that it had never been imported to our republican shores. Is it not in the teeth and eyes of every principle of republicanism? Yet our cardinal doctrine of equality is fast erasing it, and elevating labor to that post of honor assigned it by nature. True REPUBLICANS will never think the less of those who labor, and those who do should emigrate. Our country, our institutions are not congenial with their doctrines or practices, The old world is already consecrated to aristocracy and caste, this to equality. Go home to England or India ye purse-proud labor-despisers; here you are strangers in a foreign land, for our institutions conflict with your practices. Go where you can find congeniality, and leave us who love equality to the peaceable possession of this our home. Here you are eyesores, and stand in the light of those to whom this land of right belongs. Touching this matter of caste as connected with labor, Miss Charlotte E. Beecher justly observes:—

"Let any woman who esteems herself in the higher classes of society, put the case as her own, and imagine that her son, or brother, is about to marry a young lady, whose character and education are every way lovely and unexceptionable, but who, it appears, is a seamstress, or a nurse, or a domestic, and how few are there, who will not be conscious of the opposing principle of caste. But sup-

pose the young lady to be one who has been earning her livelihood by writing poetry and love stories, or who has lived all her days in utter idleness, and how suddenly the feelings are changed! Now, all the comfort and happiness of society depend upon having that work properly performed, which is done by nurses, seamstresses, chambermaids, and cooks; and so long as this kind of work is held to be degrading, and those who perform it allowed to grow up ignorant and vulgar, and then are held down by the prejudices of caste, every woman will use the greatest efforts, and undergo the greatest privations, to escape from the degraded and discreditable position. And this state of society is now, by the natural course of things, bringing a just retribution on the classes who cherish it. Domestics are forsaking the kitchen, and thronging to the workshop and manufactory, and mainly under the influence of the principles of caste; while the family state suffers keenly from the loss. Meantime the daughters of wealth have their faculties and their sensibilities developed, while all the household labor, which would equally develop their physical powers, and save from ill health, is turned off to hired domestics or a slaving mother. The only remedy for this evil is, securing a proper education for all classes and making productive labor honorable by having all classes engage in it."

One probable reason why labor is despised is, that it is generally required in such excess as to be extremely onerous. Such excess is injurious, and should never be required or yielded. On the other hand, we should render it as delightful in fact as nature has rendered it by constitution[139], thus seconding her evident intention. Nor should laborers be required to strike another blow after just comfortably tired. We should work FOR PLAY, and only when to labor is pleasure! This brings up for consideration

143. THE AMOUNT OF EXERCISE REQUIRED.

From four to six hours of vigorous muscular exercise is the least compatible with first-rate health. Excellent constitutions may endure close confinement for years, yet must run down continually, and finally break. A lower degree of health may be preserved on less exercise, but as the order of nature is to spend from six to ten hours daily in the open air[98], so the perfection of health requires a great amount of muscular action, and the more, generally speaking, the better, provided it is of the right kind. My own convictions are, that about four hours brisk labor per day will suffice for exercise, which

amount, well expended by all—rich and poor—will just about supply the human family with the comforts, if not also the luxuries of life, artificial wants and extravagances of course excepted. How admirable this adaptation of the amount of labor requisite for health to that required to provide man with necessaries of life. But we shall present the law here involved hereafter.

In the light of this required amount of exercise, what shall we say of those merchants, clerks, lawyers, students, and the sedentary classes generally, who confine themselves to their offices, desks, and books, from morning till night, year in and year out, scarcely going out of doors, except to and from their business, and then TAKING AN OMNIBUS! If these principles of exercise were put in practice, very few city conveyances would be required or patronized. One would think that our sedentaries, starved almost to death for exercise, would embrace every opportunity to take it, walking at least to and from their business, sawing their own wood, and the like. Yet fashion requires that they hire horses to do the former, and servants to do the latter. Such fashions I despise, practically and theoretically.

144. DANCING AS EXERCISE.

How much exercise given individuals should take, depends on circumstances to be determined by each individual for himself, and varies with existing capabilities of endurance, which are easily determined by the feelings at the time. As unperverted appetite constitutes an infallible guide to the required quantity of food[69], so muscular appetite, unless rendered abnormal by inaction, will inform us when, and how much exercise we require for the time being, and when we are taking it in excess, or at improper times. Excessive and also fitful or violent exercise, especially for the sedentary, is injurious. Such should exercise DELIBERATELY as well as eat slowly, else exhaustion supervenes before a due degree of exercise is obtained.

Yet some are so situated that to take sufficient exercise is exceedingly difficult. Though such should change their

business, because exercise should be a paramount consideration, yet they will find in dancing a partial substitute. Not that I recommend this amusement as generally conducted, but unequivocally condemn it. To give reasons would be to digress. Though this dancing but seldom, and then all night in hot and illy-ventilated rooms, and then going out exhausted and exposed to colds, together with most of the associations of the ball-room, are most pernicious; yet for our sedentaries to select their company, and meet at each other's houses in the afternoon or evening, always avoiding over exertion, and retiring by nine or ten o'clock, if practiced often, would supply in part that deficiency of muscular action which causes so many to sicken and die—would restore many an invalid now perishing by inches with pure inanition, and preserve and even re-invigorate the health of many now going into a decline. Dancing MIGHT be, yet rarely is, so conducted as to prove eminently beneficial, without occasioning any evil. In fact, it is founded in the nature of man, and can therefore be turned to a most excellent practical account in a great variety of ways. To sedentary young women, this form of exercise is particularly recommended. Yet I would have all dance to their own music, vocal or instrumental, or both, and also in company with their parents and elders. Young people should never dance exclusively by themselves. Yet our present purpose being to point out to the sedentary a feasible mode of taking exercise, to guard against evils too often associated with it is digressive.

Besides the sedentary, those laborers who sit or stand much in one posture, will find that change and diversity of manual action secured by dancing to dispel fatigue and promote health, and perhaps even render unhealthy occupations healthy. Seamstresses, goldsmiths, shoe makers, and many artisans of like occupations, who have no substitute, should dance daily as much as eat; and students will find it promotive alike of health and of the mental action and therefore discipline [407] they seek.

145. EXERCISE DOUBLY REQUISITE FOR THE YOUNG.

See how briskly and almost incessantly lambs frisk, calves run, colts prance, kittens play, and the young of all animals exert their muscles. Nor do children form an exception to this law. What mother or nurse has not been surprised, if not provoked with their incessant activity and noise from morning to night, year after year, from the cradle till they take leave of the parental roof. Nor can this action possibly be prevented. Try your best to keep them still and you will fail. To prevent action is as impossible as to prevent their breathing, and as injurious as impossible. This restless activity is interwoven throughout their whole natures, and for the best of reasons. Their growth being rapid, the materials for which are deposited by the blood, of course their digestion, respiration, circulation, and perspiration must be proportionally active. All these functions exercise promotes[138], and thereby augments growth—is indeed indispensable to it. Swing up an arm or foot so as to prevent its action, and see how it shrinks, and becomes enfeebled and diseased. But restoring its action enlarges, restores, and strengthens it. So of the system as a whole. To prevent the activity of children, besides being the worst purgatory that can be inflicted upon them—and I pity from my inmost soul those dear sufferers who are shut up and required to keep still—prevents the development of bone, muscle, nerve, and brain, and thereby weakens every one of their powers, mental and physical, and thus becomes the worst curse which can be forced upon them. For one I rejoice in the gambolings of children, noisy though they be, because augmented health and mentality are the products. Rather sacrifice my own temporary convenience on the altar of so great a good to them. Nor will my conscience allow me to interdict what their highest good requires. Did nature implant this perpetual restlessness to be suppressed? We fight against her requirements at our and their peril. Many a mother has followed her children to their graves because she broke down their constitutions by interdicting their play. Rather promote than retard this demand of their natures. Nor fear, much as they will play if allowed, that

they will run too much. After they have been unduly kept in for a long time, they may perhaps play beyond their strength at first, but not long. It is hardly possible for them to overdo. Not one in scores of thousands ever does this, but nearly every child in civilized life is more or less enfeebled and diseased by playing too little, together with over confinement. Parents should make provision for such play as much as for their meals, and try to promote, never retard it.

"But I cannot possibly stand their perpetual uproar," rejoins a nervous mother. Then turn them out of doors. Nor keep them in for cold or wet. Wash them all over, mornings, or even their feet, nights, in cold water [110], and neither cold or wet will hurt, but only benefit them. Their racing will convert both into instrumentalities of health [92 114 120 125]. Do not be too tender of them. Confinement kills scores where exposure kills one, and even then the exposure would be harmless but for previous confinement. There are weathers not suitable for them to be out, yet then they will want to stay in.

"And what shall we do with them then?" asks another mother. Have a play-room under cover set apart expressly for them, filled with facilities for play. It need not be warmed; they will keep themselves duly warm by exercise. No house should be without its children's play-room any more than without a kitchen or bed-room. And such rooms should be large and airy, and lighted, if possible, from the top so as to save window glass, or else furnished with inside shutters. Whole flocks of children of different ages, should be turned out to roam over hill and dale unrestrained, the elder succoring the younger, or rather, all under the care of teachers who, from every flower, and mineral, and production of nature met in their rambles, shall teach them nature, her operations, and her laws [427 470 483 484 523 526 537 546 555 557]. Whatever you do for children or what leave undone, do this:—GIVE THEM THEIR PERPETUAL FILL OF EXERCISE. In addition to play

146. CHILDREN AND YOUTH SHOULD LABOR, BUT NOT TO EXCESS.

One of the reasons for this has already been given [140]. It inures them to overcoming obstacles. It also furnishes an

exercise of muscle more severe than play, and trains them to habits of labor so essential to their health and happiness through life [138] [139] [140]. They should also practice rendering themselves serviceable to others while young. And then there is something in labor which hardens the whole system, brain included, rendering it compact and firm, and capable of enduring what those not inured to work can never sustain. Especially should labor be rendered INVITING to them, never repulsive. If possible, induce them to work from choice, not compulsion. This can be easily effected in a variety of ways. One is by giving boys a parcel of land and letting them plant, tend, and harvest on shares, and have the avails. This will also teach them the value of money, by showing them how much labor it requires to earn it. Another way is by giving them tools and a workshop, and encouraging them to make sleds, wagons, kites, boxes, and what playthings they want, as well as tinkering up other things required, of which more under Constructiveness in the next volume. By a variety of kindred devices they can be induced to labor from love of it.

Yet I protest against this subjecting young children to excessive and perpetual toil. As soon as or before they enter their teens, parents say to them in actions, if not in words, "I have toiled hard and long for you, and now you must pay me off, principal and interest, by working still harder for me." But let such remember that children have much more than paid their own way all along from birth, in the pleasure they have occasioned, and instead of owing, have actually brought their parents in debt, or rather, both are indebted to their common parent for the mutual pleasure they have occasioned each other.

Children are also put to trades too early, and bound out to severe taskmasters, obliged to work hard early and late for six or seven years, and often poorly fed and lodged at that, thus expending in the services of their master those energies required for the development of their bodies and brains. Many mechanics make it a point of economy—though it is the worst kind of robbery—to get much of their work done by apprentices. The present apprentice system is abominable—utterly

anti-republican and unjust, and often wickedly cruel, as many readers know by sad experience. Its object should be to teach the trade, not to enrich the employer. That well learned—and by this time the trouble of teaching and keeping will be amply recompensed by the labor of the apprentice—they should be allowed the full avails of their labor, instead of being compelled to work hard for several years for nothing but their food and clothing, and then thrown empty upon the world at twenty-one, whereas, if they had been paid all, or even half, the nett profits of their labor, they might have had a home of their own, and capital with which to commence business, and more than all, GOOD CONSTITUTIONS, now well nigh ruined by over-working while growing. Many children and youth, while growing rapidly, are lazy, especially those who mature late, because they require all their vitality [28] for growth, and to give them strong constitutions; nor is it expedient nor right to compel such to labor much beyond what they themselves prefer, lest they should expend in labor those vital energies required for growth. Nor need you fear that they will be as lazy after they have attained their stature and maturity—after their reservoir of vitality is full and overflowing—for their very indolence now will contribute to their efficiency then by increasing their health and strengthening their constitutions, thus giving them the greater surplus for muscular and mental labor. Yet we would have all children work every day after they are ten years old.

These principles apply equally to putting youth into stores and offices too young. And the smarter they are the worse. Slim, spare, flabby, I see their morning sun about to pass into an early cloud, if not set in the darkness of premature death! Without abundant EXERCISE they cannot possibly have strong muscles or vigorous health, and without these can never do, or become, or enjoy, much. Many readers can testify that their apprenticeship broke down their constitution and impaired all their capabilities, all their enjoyments for life.

But worst of all is this compelling young children and youth to work steadily in the factory ten, twelve, or more hours daily, year after year without vacation, or any time to play

or recreate, or near enough even to eat and sleep. See how pale, slim, haggard, and jaded out they all look. Give them a six-months play-day and see how it will improve their health, and looks, and minds. And I actually sigh for my country in view of the multitudes of our youth now subjected to this deteriorating practice—so much so, that I mourn instead of rejoice over our mechanical prosperity. The farm is the place for children. What if factory labor is light, it is confining, and prevents muscular exercise. Even excessive labor is less injurious. After the growth is completed and the constitution every way consolidated, factory labor is less injurious, but I would work desperately myself rather than let my children be confined to the factory.

Thus far our remarks have been applied to boys. Yet to girls such application is quite as important, if not even more so. Girls especially should never be confined either to the chair in sewing, or the factory-room, for reasons given in our work on "Maternity." Women may sit and sow or knit after they are thirty, and the more the older they grow, but no girl should learn any female trade requiring her to sit as in sewing, folding books, coloring prints, or observe any other fixed posture, or confine herself in the factory, till after thirty, on pain of a broken constitution and shortened life, yet elderly women may sew, tend machinery, and the like, with comparative impunity. Nor should young, growing girls be confined to lugging and tending infants.

If asked at what age children and youth may be put down to hard labor without much injury—excessive labor is injurious at any period of life—the following anecdote contains the answer. While riding in a stage with its proprietor, who keeps several hundred horses in constant employ, all of which he buys himself, I asked him what kinds of horses he preferred in making his purchases. He answered "Balky ones!" "Why?" I again inquired? "Because their fractiousness prevented their being used much till fully grown and hardened," he replied. I again inquired "At what age horses might be put down to hard work without injury?" "Not till eight years old; they ought never to be broken earlier, and

then they will wear like iron till they are thirty; you can hardly wear them out," was his answer. He would thus have one quarter of their lives spent simply in GROWING AND MATURING, as they will much more than make up this lost time by extra endurance afterwards. Only a few days previous I had rode after an extra smart horse, twenty-three years old, whose skittishness prevented her being used till about eight.

These facts, palpable to all who will open their eyes upon them, illustrate a universal law which requires that nearly or quite one fourth of the life of man should be spent in the formation and development of the physical powers. Youth should work only for play till, besides having all the vitality requisite for growth, they become full and run over with surplus animal life, so that they almost ache for something to do in order to expend it. When this period arrives, be it earlier or later, just give them a chance to do something for themselves and they will not be lazy. Instead, they will take hold of the affairs of life "with an appetite," and accomplish wonders, whereas compelling them to labor too young is the way of all others to make them hate work, and turn idlers as soon as out of their time. To put children to hard work at eight or nine is to wear them out at thirty or forty, but if you would have them live to be a hundred, give them the reins till they are twenty or upwards, and allow them to be boys and girls, instead of making them young ladies and gentlemen. But we shall touch a kindred point, under Approbativeness, in Vol. II.

147. EARLY SCHOOLING ESPECIALLY INJURIOUS.

The injuries consequent on the vitiated air of school-rooms, has already been pointed out[99]. Those of confinement and inaction are scarcely less, and often greater. This demand for vigorous and almost constant exercise in children is IMPERIOUS, and its suppression fatal. Apply your finger to their pulse.

Mark that rush, rush, rush of blood simply to supply the hand. This blood is freighted with the materials for growth, and must be much more vigorous in children than adults, because the former grow as well as live. Respiration must also keep pace with circulation, and exercise with both; so that confinement in school-rooms enfeebles the body, and thereby the mind. How perfectly miserable probably every reader has been upon the school-house bench—a sure sign of violated law[6]. But when playspells and noonings came, did not we run, and jump, and hallo, and breathe deep and fast, and thus send the boiling blood coursing throughout the system freighted with the materials of life and growth? Besides, how much faster we learned after them than before? The brain is the last portion of the system to form and mature. Hence, if youth should not be put to hand-work till twenty or upwards, they should not be confined to hard study till even a later period. Many a dull boy has made a smart man—more in proportion than from among the extra smart. Excessive parental love and vanity too often try every possible method to render their children prodigies while young, yet confining a child in school both prevents the manufacture of vitality, and then diverts what little there is from the body to the head, and thus debilitates both. This green-house method of forcing premature development weakens all their powers while alive and hastens death. But as we shall recur to the evils of precocity hereafter, we dismiss this matter here, simply adding that children should be taught mainly while on foot and in motion, and that the first care of parents should be to build a deep and broad foundation for mental greatness in powerful constitutions and strong muscles, and THEN proceed with the superstructure.

In general, nothing is lost, but everything is gained, by not sending them to school till they are twelve, fifteen, or eighteen years old, and a quarter's play will often save many quarter's sickness. But whether they go to school early or late, much or little, they should not be required to sit over half or three-fourths of an hour at a time, when playspells should relieve their restlessness and sharpen up their minds for renewed action. And the longer these playspells the better. But as our

present object is to show the importance of juvenile exercise, not education—a point elsewhere discussed, we drop it with the remark that schooling should never curtail play, because muscular action does them more good than books.

CHAPTER V.

THE BRAIN AND NERVOUS SYSTEM.

SECTION 1.

POSITION, FUNCTION, AND STRUCTURE OF THE BRAIN.

148. REQUISITION FOR SOME MENTAL FUNCTION AND ORGAN.

But suppose all those beautiful and perfect contrivances already described of stomach, liver, intestines, heart, lungs, skin, bones, and muscles—the entire man—complete and in perfect order, all would, be utterly useless but for some means of MANIFESTING MENTALITY. The mind is the man [19], and its measure his measure. This alone renders man both immortal and divine—alone crowns and allies him to angels and to God, alone endows humanity with its only wreath of glory, its only instrumentality of enjoyment. It is the mind alone which enjoys, and since happiness is the great object of existence, of course our enjoyments are proportionate to its amount and right exercise [6]. For its sake—to subserve its function—all other organs and functions were erected, and hence the one end of life should be to promote its action.

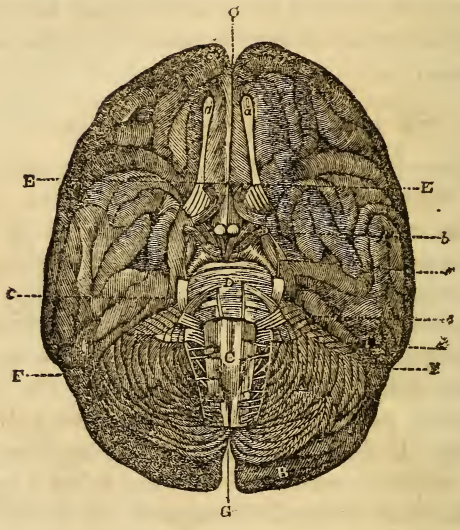
But this mentality must have its ORGAN. Nature's universal motto is—an organ for every function. As digestion, circulation, motion, hearing, and each of the other physical functions are performed by means of organs, shall not this crowning function of all have its organ also? It has; and that organ is the brain—an apparatus every way perfectly adapted to execute the mental functions.

Fully to prove that the brain is the organ of the mind, is not our present purpose [16], but its adaptation to this end. This will be seen in

149. THE LOCATION AND STRUCTURE OF THE BRAIN.

"This dome of thought, this palace of the soul" occupies the cavity formed by the skull, and of course constitutes much of that crown of humanity—the head. Being extremely delicate, it is protected by the skull, the spherical form of which is admirably calculated to guard it against injury, break the force of contusions, and prevent fractures. Beneath this skull is a tough, hard membrane, called the dura mater, which envelopes the brain, and dipping down lengthwise through its middle portion, partially separates it into two halves, called hemispheres. Under this is a thin lubricating film called the arachnoid, or spider's-web membrane, and below it again is still another fine-textured vascular membrane, which dips down into all the folds of the brain, and is perfectly full of blood-vessels and nerves, being to the brain, probably, what the skin is to the body, the arachnoid membrane corresponding to the rete-mucosum of the skin, as the dura mater does to the epidermis. The same treble structure was also described as belonging to the heart, lungs, stomach, intestines, etc.

The accompanying engraving represents the general structure of this organ. Its division into hemispheres by the falx or scythe shape process of the dura mater is represented by the fissure from G. to G. Those crooked foldings called convolulions, not unlike the folded structure of the intestines and lungs, doubtless subserves a similar purpose, namely, of allowing a far greater amount of surface to be folded up in a small compass [88], so as to produce a corresponding increase of power without much increase of bulk. Else the brain must have been enormous. And this conclusion is strengthened by the fact, that in inferior animals these convolutions are barely perceptible, while, as we rise in the scale of mental capability, these convolutions become larger and deeper till we arrive at man. And even in the human brain, those who are the most talented have the largest, deepest, finest, and most numerous



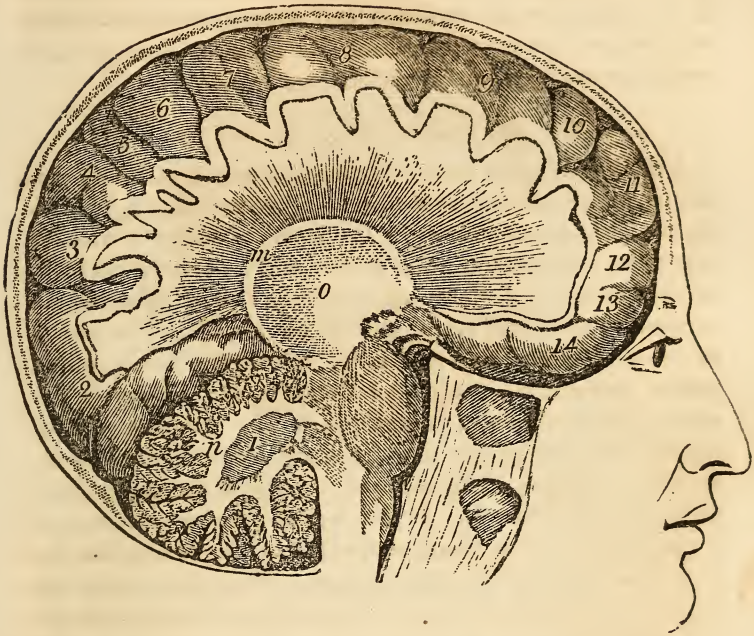
No. 20. The Structure of the Brain.

convolutions. Said that celebrated surgeon Geo. McLellan, of Philadelphia, "Called some years ago to make a post-mortem examination of the brain of one of the most distinguished public men of Delaware. I was perfectly astonished at the size and depth of its convolutions; I never saw anything like it in all my life;"—doubtless because those subjects which had come before him in the dissecting-room had been those of inferior mental endowments, and consequently of smaller convolutions.

These folds, and of course the substance of the brain, are composed of two widely differing substances—the outer called cineritious, from its pale ash color, and also cortical from its surrounding the other, while the inner is white in color, and made up of converging and diverging fibres, and called medullary. These two substances are well represented in the following engraving. Its dark folds are designated by figures 1 to 14.

The outer rim represents the skull, and those dots in it indicate its diploe—cells stationed to break the force of blows

CORTICAL AND MEDULLARY SUBSTANCES OF THE BRAIN.



No. 21. A Perpendicular Section of the Brain and Skull.

and prevent fracture. Those waves or lobes containing the figures represent the cineritious substance, and below it the medullary, the fine diverging lines of which represent the thread-like or fibrous structure of the brain.

The folds just described are here seen to appertain to the cineritious or outer portion of the brain, and this is undoubtedly that portion, the action of which produces mind. If this be so, the existence of convolutions on the two sides of the falx—just where the above section of the brain is made—goes to show that those lobes numbered, from 2 to 14, are phrenological organs, which is doubtless the case.

The brain is exceedingly soft—about the consistency of jelly—and its inner or medullary portion is composed of two sets of nerves, one of which converges from its center to its sur-

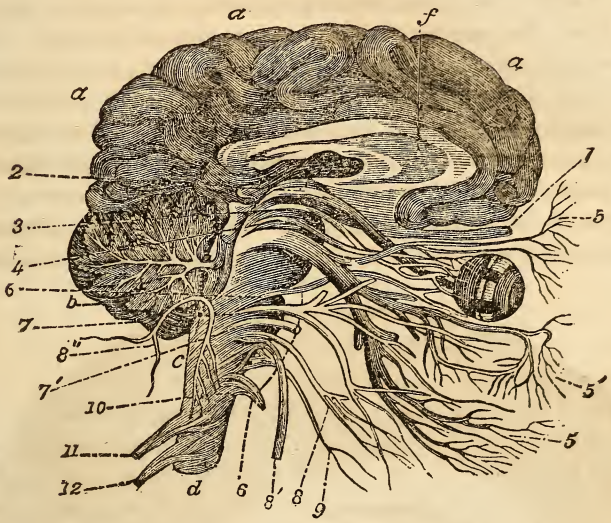
face, and the other from its surface to its center. These nervous fibres are filled with a semi-fluid—indeed, four-fifths of the substance of the brain and nerves are water—called neurine, and probably exercises and transmits sensation and mental action by means of undulations or motions.

150. THE CEREBELLUM AND ITS FUNCTIONS.

A thick membrane resembling the dura mater, called the tentorium, is stretched across horizontally just at 2, fig. 18, separating the brain into two divisions, the upper and larger of which is called the cerebrum or brain proper, which performs the mental functions, and the lower and smaller of which is called the cerebellum, or little brain, and in all probability serves to carry on the physical functions. Sever the nerve which passes between the brain and stomach, and hunger is destroyed, and digestion suspended. The stomach simply digests, whereas hunger and gustatory pleasure are experienced by an organ of the stomach, located in the cerebellum, called ALIMENTIVENESS. In like manner, the sexual emotion is not experienced in its apparatus, but in the cerebellum, by a cerebral organ called AMATIVENESS. Now since two of the physical functions are known to be performed by means of cerebral organs acting in conjunction with the physical, the former stimulated by the latter—that is, since the stomach and sexual apparatus have their cerebral organs in the cerebellum—have not the heart, lungs, muscles, liver, bowels, pancreas, kidneys, and all the other organs of the body, also their cerebral organs in the cerebellum? By what law the two former and not the latter? Are such variations and exceptions in accordance with nature? That law of universality already presented [17], settles this matter in the affirmative, and shows the true office of the cerebellum, namely, to perform the physical functions.

This conclusion is admirably fortified by the fact that all the nerves which connect the brain with the body, proceed from the cerebellum, as seen in the accompanying engraving—none from the cerebrum. This establishes the most perfectly reciprocal inter-relation between the body and cere-

bellum, and the near relationship of the cerebellum and cerebrum renders their states also reciprocal, and thus is proved and explained that perfect reciprocity between all the



No. 22. The Nerves of the Brain.

states of the body and mind already pointed out [14 15 16 18], and to be hereafter more fully applied.

These facts and deductions establish the conclusion that the brain does something besides think and feel—that it generates and sends forth that "vis animæ" or vital spirit which animates all parts of the body, infuses life and action into them, and sets and keeps the entire human machinery in motion; so that its healthy state is essential to that of the body, and the disease of the one also causes the disease of the other.

151. CONSCIOUSNESS—OR THE SEAT OF THE SOUL.

One other fact in the anatomy of the brain deserves special attention—its commissures. That falciform fissure already described, which extends from the root of the nose over the top of the head to the nape of the neck, and separates the brain into its hemispheres, dips down an inch and a half or

two inches below the top of the head, till it meets with an arch-shaped bundle of nerves, some of which run backward and forward, thus uniting the frontal with the occipital portion of the brain, and others running crosswise from side to side of the head, thus uniting the two hemispheres of the brain. This nervous bundle is called the corpus callosum, and its arched structure forms a commissure, into which a yellowish fluid is continually poured, and from which it is absorbed as continually, except in cases of hydrocephalic affections, or water on the brain, when it is retained, infuses itself in between the nerves of the brain, and expands the skull. This structure will be fully seen in the accompanying engraving of a section

No. 23. The Corpus Callosum.

M M those folds on the two sides of the falx already described. H the corpus callosum or cris-cross bundle of arched fibres, and right under it, or between it and F the great commissure we are describing. I is at the back of the head, where the tentorium separates the cerebellum from the cerebrum, and that limb and its branches, called the arbor vite, shows the internal structure of the cerebellum; A spinal marrow; B C Pons varolii; K optic nerve.

of the brain from the nose over the middle of the head, along the falx down to the spinal marrow.

The SEAT OF THE SOUL is probably in this commissure, and the corpus callosum undoubtedly serves to impart that CONCERT to all the faculties called CONSCIOUSNESS, by which one faculty calls up such of the others as may be required to accomplish the end sought. Yet as this point does not come clearly within our proposed range of description, its proof and full elucidation must be transferred to some other place.

SECTION II.

THE NERVOUS SYSTEM.

152. STRUCTURE.

THE nerves are but a continuation or extension of the substance of the brain throughout the system. This is effected by means of the spinal cord *d*, fig 19, which is enclosed in the spinal column or back-bone. The substance of this cord and of the nerves, closely resembles that of the brain, except that the cineritious is inside and the medullary on the outside—a reversion having taken place.

This cord gives off nerves at each spinal joint to the heart, lungs, stomach, liver, viscera, and all the other internal organs. When these organs become chronically irritated, inflamed, or diseased, their nerves become similarly affected, so that, since each of these nerves unite with the spinal cord at its own particular joint and no other, by pressing on the joint which receives the nerve of the heart, a soreness, perhaps sharp pain, will be experienced by the patient, and thus of all the other internal organs. This test of disease is INFALLIBLE, and tells at once and with certainty whether any of the vital organs are affected, and if so, which—five minutes being sufficient to decide the matter without mistake.

Nerves also go off through these joints to the hands, feet, muscles, bones, and every portion of the body. Another nervous track is called the great sympathetic nerve, which

traverses the cavity of the chest from thorax to abdomen. Thus a double nervous inter-communion of all the organs of the body is maintained both with each other and with their common center—the brain. These nerves are always found in close proximity with blood vessels—both arteries and nerves—the three always accompanying each other throughout the system. And not only is every principal nerve thus supplied with blood-vessels, but even every shred of every nerve, and not only every muscle, but even every fibre of every muscle, similarly supplied with both blood-vessels and nerves. Wherever there is life, there also will nerves be found, and the more life in any animated thing or part there the more nerve.

153. THE FUNCTIONS OF THE NERVES.

These nerves are of three kinds—those of sensation, those of voluntary motion, and those of involuntary motion. The nerves of sensation proceed from the back half of the spinal cord, and those of motion from the anterior half, and soon after they issue through the joints they unite, are incased in one common sheath, and cannot be distinguished from each other. Yet on cutting the nerve, say that which goes to the hand or issues from the anterior half of the spinal cord, all sensation is destroyed, so that the hand may be cut, burnt, anything, without feeling it, while on cutting that from the posterior half, all power of motion is destroyed. The involuntary nerves go to the heart, lungs, stomach, and other internal organs so as to cary on their several functions irrespective of the will, while asleep, and when attending to the affairs of life, an arrangement absolutely indispensable.

The nerves of voluntary motion are distributed mainly to the muscles and enable us to govern them at will—to move the hands, feet, and body, in accordance with the determinations of the will, of which all of us are perpetually conscious; while those of sensation are ramified mostly upon the SURFACE of the body, stationed as sentinels upon the outer walls to warn against the approach of all enemies to life and health—to tell us when we are too warm, or too cold, or in contact with any-

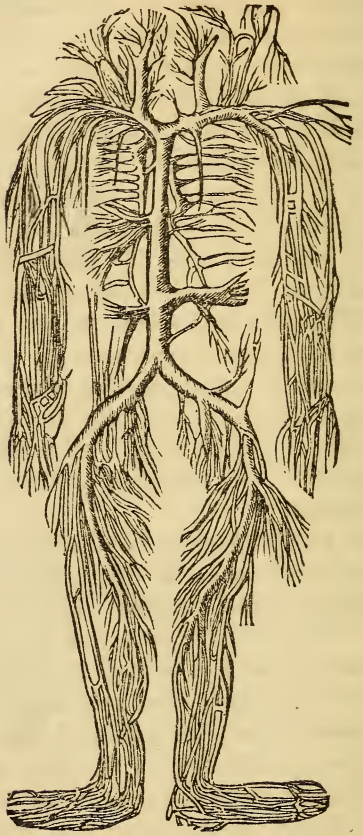
thing injurious. The opinion has already been expressed that the skin consists of a network of blood-vessels and nerves—an opinion confirmed by the fibrous and porous structure of leather, especially when tanned to excess—so minutely ramified that the finest needle cannot be thrust through any part of it without lacerating and paining some of them. The minuteness of this ramification is absolutely inconceivable. Nature is as infinite in her littleness as in her greatness. Our huge earth, compared with which a mountain is as a grain of sand, is but an atom compared with her planetary sisters, Saturn and Jupiter, and even the whole solar system itself is a mole-hill compared with its grand center, the sun, so massive as to baffle all known attempts at comprehension. Nor this merely, but sun and planets if rolled together into one mighty pile, the merest hillock compared with that vast belt of suns and worlds perceptible to human vision. And even all this probably only a speck of the boundless universe! O God, how vast is thy greatness![548]

Yet this same Infinite Architect of the universe descends as far below us in littleness as he rises above us in vastness. Infinite magnitude, infinite capillary ramifications, are both alike to him. Words utterly fail to describe, and the human mind to conceive, the fineness of these capillary formations, as in the structure of his lungs, blood-vessels, pores, and nerves. Verily, "thy ways, O God, are infinite." In this infinite littleness of nervous ramification in the skin, sensation takes place. These nerves ultimately end in an infinitude of little papillæ or feelers, which cover the entire surface of the body, and create that sensation of which we are all conscious.

This capillary nervous structure, as also the general arrangement of the nervous system, is well illustrated in the following engraving.

These nerves are much more abundant at the surface of the body than internally; and hence amputations, and all cuttings and bruises, biles and sores, the greatest pain is nearest the skin—it being comparatively slight after the cut or hurt has fairly passed below the skin. Yet when a bone

CAPILLARY NERVOUS RAMIFICATION.



No. 24. The Nervous System.

has become inflamed it is also exceedingly painful, yet here also the pain is mainly at its SURFACE. Since the inner portions are protected by the outer, as great a supply internally as externally would be a useless expenditure of vitality.

Yet a still greater sentry of nerves is stationed at some points than at others—about the eyes, hands, and especially ends of the fingers, the utility of which is beyond all computation, as all know by perpetual experience.

154. IMPORTANCE OF SENSATION.

The importance of the sensation thus effected is incalculable. Without it we could never know when we were too cold, or too warm; when our flesh was burning, or freezing, or bruised, or mangled, or experiencing any sort of injury or destruction, unless we chanced to see it. But now, the instant they come in contact with whatever injures them or the system, they take on a painful action, and thus cause a spontaneous shrinking from the noxious body, which saves from farther damage. The suddenness with which this warning and shrinking occur as when we touch fire, or are cut, or pricked with any sharp instrument is astonishing. The very instant we touch fire, for example, we jerk the part burned from it, yet, instantaneous as it is, the nerves feel pain, telegraph that pain to the brain, muster the will, which gives the muscles a mandate to remove the part affected, and they obey—all in the twinkling of an eye. The importance of this instantaneousness is very great, because the injury in cases of burns, punctures, bruises, etc., is extremely rapid, so that, but for this instantaneousness, great havoc would occur before it could be arrested, which this suddenness now prevents. This arrangement of pain, then becomes one of the most useful institutions of our nature [3].

155. IMPORTANCE OF HEALTHY NERVES.

But this function of pain is by no means the only one experienced by these nerves—indeed, is not their chief, or even their natural one [4]. Strictly speaking, it is their abnormal function. They never take on this painful action except the body is abnormally affected, and when they do, do so as a matter of necessity, not as their natural function. Their normal function is to yield a pleasurable sensation when and because the body is in a natural and therefore agreeable state [1]. For such a state nature has amply provided. Every arrangement of external nature is adapted to give them pleasure, and this is their sole product when their laws are observed, such painful action being consequent only on the violation of such laws. Nor do we realize how much pleasure they yield us.

Like breathing, it is so perpetual as not to be appreciated, yet it is none the less real. And it might be doubled many times over if we but kept them in a perfectly healthy and highly active state. Take some examples. Your face, before it is washed in the morning, does not feel half that pleasurable glow experienced on washing it. Why? Because the ablution cleanses and quickens these nerves. Or wash say one limb, hand, or arm, or half of the body, or a part of a limb, and not the balance, and the washed portions will feel as much more clean, susceptible, and comfortable as can well be imagined. The experiment is well worth trying, and powerfully enforces the importance of those ablutions of the whole body already recommended [110]. Nor do those know who have not tried the experiment how much more lively, brisk, buoyant, and happy, bathing renders those who practice it, not at the time merely, but for hours, and perhaps days afterwards.

So also colds which impair the sensitiveness of these nerves, either benumb them so that they feel but little, or fever them, and cause a kind of restless, crawling, burning, sensation, which makes us almost want to "jump out of our skin." What we call the creevels consist in a crawling, feverish, painful state of these nerves, and can be obviated by restoring them to healthy action. Nor can we conceive how much of our suffering comes directly and indirectly from the disordered and therefore painful condition of these nerves; nor how superlatively happy we could render ourselves by keeping these feelers in a vigorous and perfectly healthy state. But the entire drift of our habits tends to deaden and disorder them, and thus to convert the pleasure they were created to confer into pain. We begin to vitiate these nerves in the cradle by extra dressing and a confined and over-heated atmosphere [120], and go on to weaken and disorder them more and more through life. Every cold we take, they suffer—are the chief sufferers. This we never need to do, and ought by all means to avoid. Have you never felt, while suffering from cold, an indescribable sensation of nervous crawling uneasiness, amounting to intense pain, so that you could neither sit, nor stand, nor

walk, nor lie still, but seek a perpetual change of place, yet without finding relief? You feel as though you would fain spring right away from yourself, or, snake-like, shed your skin—if you could only relieve yourself from this wretched state of feeling. This state of the nervous system is particularly apparent when we have taken cold—its warnings heeded would prevent all colds—and in the incipient stages of fever, while the chills of ague and fever are on, and generally when we are unwell. What are called nervous, hystericky people, are particularly liable to its attack, and their condition is indeed pitiable. Yet they should not have brought on this nervous disorder.

156. EFFECTS OF DISEASED NERVES UPON THE MIND.

But the evils of diseased nerves do not stop here. They extend also to the mind, and render the entire being more and still more wretched the more they are disordered. They not only inflict the creevles and the fidgets upon the body, but still more upon the mind. That connection of the nerves of the skin with all the nerves of the body [153], and of the latter with the cerebellum [152], and through it with the cerebrum, engenders the same condition in the brain which exists in the nerves [15 16 17]. It is not possible for the nerves of the skin to be affected, without similarly affecting both brain and mind. If the former are in a feverish, unhappy, or painful state, they diffuse that state throughout all we think, say, do, desire, and feel. Nervous people—by these are meant those whose nerves are disordered, though all have nerves—are always fretful. They feel wretchedly in body and mind; and if they do not worry, tew, and find fault with everybody and everything, it is not because they do not feel irritable. Disordered nerves would render an angel as cross as a fury. However amiable a woman may be by nature, just as surely as her nerves become disordered just so surely she becomes peevish and fretful, if not ill-natured and bad-dispositioned. She would find fault in paradise if there, thus disordered. But, restore her nerves to their normal, and therefore happy state, and you restore her to her original serenity of mind and sweetness

of temper. What worried her before now gives her pleasure. She laughs now at what she scolded then. Those mental troubles which then preyed upon her mind, have now taken their flight. Indeed, she was troubled in mind only because disordered in body. The troubles of such are imaginary, not real; or if real, are magnified in the exact ratio of the disease of their nerves. If such have no real cause of trouble, they will make it out of whole cloth. As every motion and touch in the gathering bile give pain, which, if well, would give pleasure, so with their minds. The irritation of their nerves irritates the brain, and this renders them inordinately irritable about trifles, even in spite of everything calculated to promote a cheerful and happy frame of mind. Trifles excite them more than should the cares of kingdoms. A great load presses perpetually upon them. They feel as though some terrible calamity—what, they know not—impended over them, ready to fall upon and crush them. Their excited imaginations magnify molehills till they become mountains. They are rendered wretched from morning till night by a perpetual fever of excitement; tossed back and forth by currents and counter currents of feeling, which they find it impossible to control. At one time, they are elated beyond measure, and full of ecstasy. Some trifling thing, too insignificant to affect a healthy brain, casts them into the very depths of despair. The sensibilities are morbidly alive to everything. They retire to their couch, but not to sleep. The boiling blood courses through their veins, while the laboring pulsations of their hearts shake their whole frame. Their thoughts wander to the ends of the earth, but to no purpose. They think and feel upon everything, only to increase their disease, and aggravate their mental sufferings. If Cautiousness be large, they are afraid of their own shadows, and see their path filled with lions and tigers. If Approbativeness predominate, they thirst for fame, but see the cup of praise dashed from their lips by merely imaginary neglects, or reproofs which are so construed as to induce the deepest chagrin and mortification. They seek sleep, but find it not. Hour after hour they turn upon their damask couches, exhausted

by mental action, even to prostration, but unable to compose their excited, erratic feelings. Their brighest thoughts flit like meteors across their mental horizon, only to vanish in midnight darkness. And if tardy sleep at last folds them in his arms, frightful dreams disturb their shallow slumbers, and they awake enshrouded in deep, impenetrable melancholy. They feel most keenly, only to feel most wretchedly. Now and then, a sign, or groan, or "O dear me!" escapes them, and they internally feel, "O wretched man that I am." They feel burthened with, they know not what, but this only oppresses them the more. Things, otherwise their joy, are now their misery, and everything sweet is rendered bitter. Their nervous energies are wrought up to the highest pitch of inflamed action; yet they have no strength to endure this excitement. Days and weeks roll on only to augment their miseries, and to increase their exhaustion. Their excited minds thirst for books, but mental application only enhances both their malady and its miseries. Do what they will, be they in what circumstances they may, their disordered nerves turn all they touch into occasions of wretchedness. The difference between the talents, character, and happiness of the same person when his nerves are healthy and when diseased, is heaven-wide. None can ever know but those who know by experience. The way is thus prepared for showing

157. HOW TO KEEP THE NERVOUS SYSTEM IN HEALTH.

Since healthy nerves render us thus happy, and disordered nerves thus miserable, the inquiry just proposed becomes as important as happiness is desirable and pain dreadful. Our answer is, let them "whistle themselves"[26]. Do nothing to derange them, and they will never disorder themselves. The two general directions are, first, keep the skin clean and active by bathing[109 110], and secondly, give them ACTION. Exercise is as requisite to them as to the muscles, or lungs, or any other portion of the body. Yet who ever thinks of providing exercise for them? One means of securing their action is by promoting cerebral action, of which in Vols. II and III, and the other by exercising them direct. Nor can I resist the convic-

tion that nature abounds with herbs and things, which, applied externally, in the form of ointments or decoctions, will secure a most delightful glow of nervous feeling, and consequently of comfort, bordering on ecstasy. Yet this is only inferential.

But the great direction, after all, is, not to over-tax them by highly stimulating meats and drinks, such as alcoholic and fermented drinks, narcotics, as tea, coffee, tobacco, and opium, or mustards, spices, and condiments generally. And they usually begin their work of derangement in the cradle. No kind of stimulants should ever be administered to children or youth. They are sufficiently excitable and active already. Opium in any of its forms is most detrimental for infants. But of this also in "Maternity."

But mental excitement, anxiety, and trouble, more effectually derange the nervous system than any other cause, and should therefore be avoided. The fact is, all should arrange their houses, lands, business, domestic affairs, and everything around them, little and great, so as to render themselves as happy as possible, and by all means avoid occasions of sad feelings and vexations. And if trouble does overtake them, as the loss of friends, domestic difficulties, failure in business, or anything of the like, banish it as far as possible from the mind, and try to think on what gives pleasure. Children also should be crossed and provoked, and especially flogged as little as possible, because the painful excitement thus occasioned is directly calculated to disorder the nervous system.

To show how to restore disordered nerves would now be in point, yet can be more effectually presented presently.

Having expounded the principal organs and functions of the human body, and shown how to preserve them in a healthy and vigorous state of action, we are thus brought to consider the general subject of diseases and their remedy, which, next to the preservation of health, becomes an all absorbing subject of human inquiry.

CHAPTER VII.

THE REMEDY OF DISEASES.

SECTION. I.

OBSERVANCE OF THE LAWS OF HEALTH MORE EFFECTUAL RESTORATIVES THAN MEDICINES.

158. EXISTENCE, DEFINITION, AND CURABILITY OF DISEASE.

ALL the physiological organs thus far described, though their normal function is fraught only with life and happiness[20], yet are capable of taking on that abnormal or diseased function which results in pain and constitutes disease. Indeed, sickness and disease consist in nothing else. They assume different forms according to the organs disordered, the degree of the disorder, and some other circumstances; yet the nature of disease is much less complex than generally supposed.

Nor are these diseases incurable. So far therefrom, the existence of remedial agents is not a matter of doubt but of experimental fact. Though neither pain nor disease form any part of the ordinances of nature, yet a secondary provision for their existence consists in the fact that the violation of the physical laws occasions them, thus warning us against farther violation. And here nature might have left us. All broken bones, severed nerves and blood-vessels, and all other consequences of broken law might have been left in that state in which they occurred. But an infinitely benevolent God has devised a REMEDIAL principle—has made provision for a more or less complete re-union of broken bones and lascerated blood-vessels, muscles, and nerves, and for a restoration of debilitated and disordered functions—a provision as beautiful in device as useful in result.

Nor is this curative process contracted in scope or feeble in power. So far therefrom, it is almost a universal PANACEA.

Though a few of the violations of the physical laws are punished with incurable penalties, such as an amputated head, a pierced heart, and the like, yet most cases of disease, poisons not excepted, taken in season, can undoubtedly be cured. In fact, nature seems to have taken the utmost pains to vary her remedies so as to cure most if not all the "ills that flesh is heir to." As, wherever any venomous serpent inhabits, there will also be found some herb which, seasonably applied, will effectually cure its bite, so doubtless of all other forms of disease[17]. Nor need we import medicines, for they will be found wherever disease can exist, every way adapted to all the disorders incident to its locality.

159. VEGETABLE AND MINERAL MEDICINES.

These medicines abound in the vegetable kingdom; and abounding there, why look any farther for them? Since some are there, why not ALL?[17] And since simple medicines exist in the vegetable kingdom already prepared at our hands by nature, why resort to art? Can man compound and prepare them better than God? Does the laboratory of art surpass that of nature? The simple fact of the existence of remedial agents already prepared, shows that we need not take nature's work out of her own hands[17].

Especially, must we POISON the system in order to cure it? Shall we destroy life to enhance it? Does that which is constitutionally hostile to life promote it? Perfect nonsense. In the teeth of every principle of nature. Besides, her entire economy is PLEASURE, never pain[1]. Now poisons are always painful in their operation, besides being nauseous to the taste —of itself sufficient to condemn them. As those kinds of food which the system requires relish best[33], so we shall CRAVE what medicines we require. The curative process is constitutionally pleasurable, never painful. So treat a wound as to heal it in the best manner possible, and it will feel good and comfortable. Only what interferes with its restoration, occasions pain. And this law holds true of all forms of convalesence. This new view of the restorative process is true, theoretically and practically. Shall obeyed

law give us pleasure[6], and a return from transgression to obedience necessarily occasion pain? Does anything but violated law cause suffering?[6] Of course, then, medicines bitter to the taste or painful in their operation, nature condemns in and by the very pain they occasion. Since obedience to law is followed by pleasure, therefore whatever the system requires, will give us pleasure, ALL pleasure. I can read nature in no other way. What medicines the system requires it will CRAVE AND LOVE. Not that bitter medicines should never be taken, but that, when required, their very bitterness will be sweet. Otherwise, nature inflicts pain to secure pleasure, which she never does. Her motto is, ALL good, no evil. Any other view of nature misrepresents and belies her; or, rather exposes him who makes it. Though she often brings good out of evil, and makes even the wrath of man serve her, yet she brings still greater good out of all good. Our shortest and surest road from sickness to health, therefore, never conducts us through what is repulsive or painful, but only through what is pleasurable. This fully established principle of nature unequivocally condemns

160. THE USE OF POISONS, CALOMEL, AND DEPLETIONS.

The very principle upon which they act, is their destruction of life. Taken in health, they induce sickness; much more aggravate it. And their reputation for curing diseases is due mainly to abstinence from food, perspiration, and emptying the stomach, all of which can be effected by processes entirely harmless. Their effect upon the teeth alone, brands them with unequivocal condemnation; for whatever injures them first, disorders the stomach. Their decay foretokens incipient dyspepsia. Hence, since they are always impaired by these medicines—and whoever has taken poison is a living witness of this fact—they of course always enfeeble the stomach.

Narrowing down our observation to that popular medicine CALOMEL. It powerfully stimulates the liver, but stimulates by POISONING it. Hence liver affections almost always follow its administration—always except when both stomach and

liver are extra powerful. Dyspepsia follows its use almost as surely as sunrise daylight, because induced thereby. Let observation, the more extensive the better, pronounce the verdict. Language can never adequately portray its ravages on health and life. On this point hear Professor Chapman, of Philadelphia, to his class :—

GENTLEMEN :—If you could see what I almost daily see in my private practice in this city, persons from the South, in the very last stages of wretched existence, emaciated to a skeleton, with both tables of the skull almost completely perforated in many places, the nose half gone, with rotten jaws, ulcerated throats, breaths more pestiferous, more intolerable than poisonous upas, limbs racked with the pains of the Inquisition, minds as imbecile as the puling babe, a grievous burden to themselves and a disgusting spectacle to others, you would exclaim as I have often done, 'O! the lamentable want of science that dictates the abuse of that noxious drug calomel in the Southern States!' Gentlemen, it is a disgraceful reproach to the profession of medicine, it is quackery, horrid, unwarranted, murderous quackery. What merit do gentlemen of the South flatter themselves they possess by being able to salivate a patient? Cannot the veriest fool in Christendom salivate—give calomel? But I will ask another question. Who can stop its career at will, after it has taken the reins in its own DESTRUCTIVE AND UNGOVERNABLE HANDS? He who, for an ordinary cause, resigns the fate of his patient to mercury, is a vile enemy to the sick; and if he is tolerably popular, will, in one successful season, have paved the way for the business of life; for he has enough to do ever afterwards to stop the mercurial breach of the constitutions of his dilapidated patients. He has thrown himself in fearful proximity to death, and has now to fight him at arms-length as long as the patient maintains a miserable existence."

Dr. Graham, of Edinburgh, in speaking of mercurial medicines, says :—

"They affect the human constitution in a peculiar manner, taking, so to speak, an iron grasp of all its systems, and penetrating even to the bones, by which they not only change the healthy action of its vessels, and general structure, but greatly impair and destroy its energies; so that their abuse is rarely overcome. When the tone of the stomach, intestines, or nervous symptoms generally, has been once injured by this mineral, according to my experience, (and I have paid considerable attention to the subject,) it could seldom afterwards be restored. I have seen many persons to whom it has been largely given for the removal of different complaints, who before they took it, knew not what indigestion and nervous depression meant, only by the description of others; but they have since become

experimentally acquainted with both, for they now constantly complain of weakness and irritability of the digestive organs, of frequent lowness of spirits and impaired strength; all of which it appears to me, they will ever be sensible. Instances of this description abound. Many of the victims of this practice, are aware of this origin of their permanent indisposition, and many more who are at present unconscious of it, might here find, upon investigation, a sufficient cause for their sleepless nights and miserable days. We have often had every benevolent feeling called into painful exercise, upon viewing patients already exhausted by protracted illness, groaning under the accumulated miseries of an active course of mercury, and by this forever deprived of perfect restoration. A barbarous practice, the inconsistency, folly, and injury of which no words can sufficiently describe."

This is the testimony of its FRIENDS—of distinguished members of the medical FACULTY—and is true of the PRINCIPLE on which calomel and all mineral poisons act. And the more virulent the poison, the worse. Those who take them, may recover, yet it will be in SPITE of both disease and medicine. And their recovery will be slow, and constitutions impaired.

"But," retorts one, "I took calomel, arsenic, quinine, and other condensed poisons, was immediately relieved, and more robust afterwards than before." Aye, but how long did you REMAIN so? In a few months your stomach became impaired, and various aches, to which you were before a stranger, afflicted you. Still, all are quite welcome to swallow all the rank poisons they please, but for one, however sick, I should rely on other remedies, particularly perspiration.

Scarcely less detrimental than these poisons is that draining of the life's blood which generally accompanies it. It does not extract the disease, or at least only in proportion as it withdraws life itself, and repeated depletion diverts the vital energies from brain and muscle to the EXTRA manufacture of blood.

A summary of these medicinal principles shows that we place far less reliance on medicines, even vegetable, as restorative agents, than on physiological prescriptions. Obey the laws of health, and we need not be sick, and when sick a return to this obedience is the most direct road to health. Still the existence of medicines shows that they should be

taken. Yet, why in the present highly condensed form? Why not in that diluted form in which we find them in nature? In short, why not take them along with our FOOD?

161. A MEDICAL DIET BETTER THAN CONCENTRATED MEDICINES.

That certain kinds of food are eminently medicinal, is a matter of universal experience. Thus, many kinds act as powerful cathartics. Then why not follow nature and always move the bowels by diet instead of by concentrated medicines? But we shall touch this point again. What we wish now, is to establish the PRINCIPLE that nature has furnished us with all the medicines we require in food, and that medicines thus administered, are always efficacious, and never "leave a sting behind." We have already shown that what the system requires, it will RELISH [33], and that what is either repulsive to the taste or painful in its operation is therefore injurious[150]; the plain inference from which is, that whenever the system requires any particular kind of medicine, appetite will crave those kinds of food which will effect a cure. Every medicinal law of nature centers in this focus. Granted, that mankind has not yet ascertained a tithe of the different kinds of food adapted to remedy given diseases, yet the fact that SOME kinds are "good for some complaints," taken in connection with that wholesale law already demonstrated [17], establishes the conclusion that ALL diseases have their specific cures in particular kinds and commixtures of diet. I can read nature's curative laws in no other light. Yet more on this point under the cure of dyspepsia.

"But when we are sick we have no appetite for any kind of food," objects one. Then fast. This is what your system then demands [65 69 72]. Let it not be supposed that we rely mainly on medicines, nor even on medicinal food, to cure diseases, but on a general observance of the laws of health, and medicines, in food and out of it, as secondary aids. Nature is our great physician. Those patients who put themselves under her treatment may rest assured of a speedy and effectual cure.

SECTION II.

BALANCE OR PROPORTION AMONG THE FUNCTIONS ESSENTIAL TO HEALTH—ITS PRESERVATION AND RESTORATION.

162. PROPORTION A LAW OF NATURE.

WHAT but PROPORTION between those attractive and repulsive forces which cause the motion of the earth, keeps it in its orbit? As the top of the tree increases, so do its roots; and any great amputation of either, without a corresponding pruning of the other, proves injurious. This law runs throughout the vegetable kingdom. It obtains equally in the animal economy. Nature requires and compels us to breathe the more the more we exercise. Thus, the more we use our muscles, as in working hard, walking fast, or up hill, running, lifting, and the like, the more we must breathe; the increase of respiration being exactly in proportion to that of muscular action. Of this all are witnesses every time they increase or diminish their exercise. Nor will nature allow us to breathe copiously without proportionate action of body or mind.

This law applies equally, though less obviously, to food. Who does not know that labor and all kinds of exertion, whether mental or physical, enhance the digestion as well as appetite for food? Hence, laborers eat more than sedentaries. And those who will eat more than do, must suffer. This law cannot be broken with impunity. In fact, the broken constitutions of most of those who go from the farm and the workshop to college, or some sedentary occupation, are caused mainly by violating this law of proportion. They continue to eat as before, yet do not work off that food, and hence the head-aches, ennui, debility, nervousness, dyspepsia, and kindred diseases of our literary and sedentary classes. Study does not make them invalids, but is actually promotive of health and longevity. They are enfeebled by over-taxing their stomachs while they starve their muscles for want of action.

Take that city belle, rendered delicate, nervous, sickly, miserable, by excessive nervous and cerebral derangement consequent on novel reading, parties, amusements, and all the excitement of fashionable city life. Medicines can never cure her, but work can. Her malady consists in a predominance of nerve over muscle, and her remedy in restoring the balance between them. She is doomed either to wear out a miserable existence, or else to EXERCISE HER MUSCLES; nor can salvation come from any other source. And one of the great reasons why journeyings, visits to springs, voyages, and the like, often effect such astonishing cures, is that they relieve the nervous system, and at the same time increase muscular and vital action. The same exercise taken at home, will cure them quite as speedily and effectually by the same means—a restoration of proportion between their functions. Nine in every ten of the invalids of our land, are undoubtedly rendered feeble by this one cause, and can be cured by labor. How many thousands, so weakly and sickly that they begin to despair of life, finally give up their business and move upon a farm, and soon find themselves well. Exercise has often cured those who have been bedridden many years, as seen in the following.

A physician of some repute in Lowell, Mass., was called thirty miles in great haste, to see a sick woman, whose case had thus far baffled all medical treatment, and was regarded by all her friends as hopeless. All they expected was merely to mitigate a disease of long standing: recovery being considered out of the question. The doctor came, saw that she was very nervous, and had been dosed almost to death, and told her that if she would follow his directions implicitly, he could cure her; for he had one kind of medicine of great power, but which was useful only in cases exactly like hers, in which it was an infallible cure. After telling her how often she must take it, he added, that she must get up and WALK ACROSS THE ROOM the second day, and RIDE OUT the third. "Oh, that she could never do, for she had not been off her bed in many years, and was so very weak," etc., etc. "Oh, but," said the doctor, "this medicine will give you so much strength that you will be able to do so, and it will pre-

vent any injurious consequences arising therefrom. And, besides," he added, "the medicine will not operate, unless you stir about some. Do just as I tell you, and you will be off your bed in ten days." She sent an express thirty miles, the medicine being so rare that he did not take it with him, after his bread pills, rolled in aloes, to make them taste like medicine, and took them and the EXERCISE as prescribed, and the third day she actually got into a carriage, and in ten days was able to leave her bed, and soon after was able to work, and yet lives to be a blessing to her family, and to pour upon the doctor a literal flood of gratitude for performing so wonderful a cure—a cure which none of the doctors had been able to effect, and which nothing but restoring the lost proportion between her nerves and muscles could have effected. Nor do I hesitate to affirm, as my deliberate conviction, that nineteen-twentieths of the invalids, especially females, of our land are rendered so mainly by excessive nervous and deficient muscular and vital action, and can be cured by banishing care, and exercising in the open air.

I say in the open air, because many are rendered invalids, not by want of sufficient exercise, but by insufficient BREATH. Yet females, and those who work hard in-doors perpetually, such as clerks in packing, unpacking, etc., often lose their health because they do not BREATHE in proportion to their exercise. That is, they inhale rarefied air, and thus do not obtain a supply of oxygen adequate to its consumption. The object of breathing is to obtain this oxygen, and the reason why we breathe the more the more we exercise, is that we obtain the more oxygen. But when, though we breathe copiously, we do not obtain a due supply of oxygen, the evil is analogous to a proportionate suspension of breath[86]. Such should work less, and thus preserve the proportion between the consumption and the supply of oxygen.

Consumptive families and patients furnish another illustration of this principle. Why consumptive? Because their brains and nerves predominate over their vital and muscular apparatus, as is evinced by the fact that they are slim, sharp-featured, small-chested, and have small muscles, great sen-

sitiveness, intense feelings, clear heads, and fine feelings. This DISPROPORTION of function constitutes their consumptive tendency. Restore the balance and you obviate the tendency. Or thus, their lungs are too small for their brains. Apoplexy, gout, obesity, corpulency, and the like, are caused by the opposite extreme, and can be cured by eating less and working more.

Precocious children and youth furnish still another illustration of our doctrine. How frequent the expression "that child is too smart to live;" because general observation attests the premature death of most extra smart children. Hear that broken-hearted mother enumerate the virtues of her departed child—tell how fond of books, how quick to learn, how apt in his remarks, how sweet-dispositioned and good, all produced by excessive cerebral action, and his death by the predominance of mind over body. Its head ate up its body. As the vital energies cannot be expended twice, and as an extremely active brain robs the muscles and vital apparatus[78], the latter cease to grow, become feeble, are attacked by disease, and die, and of course the brain also dies. And such parents, ignorant of this principle, too often ply such prodigies with books and mental stimulants, and thus aggravate the disproportion and hasten death, whereas they should pursue the OPPOSITE course—should use every exertion to restrain cerebral and promote muscular action.

Extra talented and lovely youth are also more mortal than others. The flower of both sexes are more liable to die young than those more coarsely organized—because of this same preponderance of cerebral over muscular and vital power. A large proportion of those who take our first college appointments die soon after they graduate, because they have studied, studied, studied, night and day, year in and year out, thus keeping their brains continually upon the stretch, yet using their muscles little more than to go to and from their meals and recitations. Is it any wonder that they pay the forfeit of impaired health, blighted prospects, and premature death? What an omission that their entire range of classical studies should not embrace as important a law as this.

The working classes furnish a converse illustration of this

law. They exercise their muscles too much and brains too little. They labor, eat, and sleep, and that is about all. To those crowning pleasures of humanity, the exercise of MIND, they are comparative strangers. Their muscles rob their brains as effectually as the heads of the literari rob their bodies[78]. If they sit down to read, or listen to a speaker, they fall asleep. Their finer sensibilities become blunted by inaction, just as those of the fashionable classes become morbid by over action. Their minds are sluggish, thinking powers obtuse, feelings hard to rouse, and all their capabilities of enjoyment partially palsied, because most of their energies are directed to their muscles. Besides this loss of enjoyment, they are much more subject to actual disease than they would be if they labored less and studied more.

Slaves furnish still another illustration of the violation of this law. They exercise their muscles still more, relatively, and their brains still less, books and study being prohibited.* Hence no small share of their admitted mental obtuseness. This principles also applies measurably to the working classes of the old world. Laborers generally might live many years longer, and much more happily if they worked less and studied more.

Unhealthy trades, as shoemaking, saddlery, drawing, painting, sewing, and the like, are generally rendered so by exercising only a portion of the system, and can be rendered salubrious by calling into vigorous exercise the dormant limbs and muscles an hour or two per day[141]. To seamstresses this advice is particularly applicable and important. Sitting for months together in one posture, arched inwardly and their shoulders thrown forward, thus doubly impeding respiration[85], digestion[77], and all the vital functions, at the same time taking next to no exercise, no wonder that so many of them break down even while learning the business, and sew in misery for life.

* Can that institution be "all right" which represses intellect? Must mind, that only ultimate end of human creation be fettered? The unrestricted exercise of intellect is as inherent a right of every human being as breath or sight.

Let such walk at least two miles per day, or dance an hour before retiring[144]; and also sit up STRAIGHT while they sew, and it will not injure them. They should also restrict their diet.

But the institutions of society are most unfavorable to this required proportion of muscular, vital, and mental action. As things now are, those who work at all, work excessively; and as labor is considered a disgrace[145], all who can, are straining every nerve to live without it. Society should be so constructed as to require laborers to work only about half the day, and allow them the balance for mental and moral cultivation, while the literary, sedentary, and fashionable classes should labor several hours every day, if not for wages, at least for health. The fullest measure of personal happiness requires that all should appropriate about eight hours in every twenty-four to the vital apparatus—to sleep and food, or the supply of exhausted animal energy—about eight hours more to muscular exercise, mostly in the form of manual, productive labor, and about eight more to mental cultivation and moral improvement[550]. "All work and no play," cuts off that vast range of pleasure designed and adapted to flow into the soul of man through the channel of MIND; and continued mental application, by concentrating vitality in the brain, withdraws it from the muscles, stomach, and heart, thus impairing respiration, circulation, and all the vital functions, and of course curtails talent and even life itself, while epicures, gentlemen and ladies of leisure, and all fashionable idlers rob both muscle and brain, so that all these classes fail to obtain the great end of life—happiness[2], whereas, if all would labor about eight hours per day, so as to promote all the animal functions and ensure health, they would thus furnish the brain and nervous system with an abundant supply of that animal energy so indispensable to mental power, and thus vastly enhance clearness of thought, retentiveness of memory, intellectual attainments, and moral excellence. Nor can any become great or good without MANUAL LABOR. Man must exercise if only to keep his brain in working order, it being to the brain what the sharpening of his tools is to the workman. Laborers plead that they have no time to work, yet they should TAKE time.

They were created to ENJOY; and since they can enjoy much more by commingling study with labor, practical wisdom requires that they make mental culture as much a part of their business as work. Business and professional men, lawyers, ministers, bankers, brokers, merchants, clerks, editors, artists, etc., again say they have no time for exercise, but let such remember that this is the very way to MAKE time, by augmenting mental efficiency, and especially prolonging their lives. The result is that our business, fashionable, and sedentary classes have a great preponderance of the mental temperament over the vital and muscular, and hence are delicate, sharp-favored, homely, excitable, dyspeptic, nervous, melancholy invalids, living but a short and that a miserable life, while the working classes, though endowed by nature with excellent heads, yet lack that cultivation requisite to the development of their natural talents and virtues.

Were the sole object of my life to see how long I could live, or even how happily, I would divide each twenty-four hours into three parts, and devote eight hours to sleep, rest, and meals; eight more to vigorous exercise, or rather, hard labor; and the balance to the exercise of mind, uniting the last two whenever practicable. Or, even were my object to become intellectually great or learned; or were health my object; or were all these combined, I would pursue the same course. Burritt, the learned blacksmith, is often referred to as an intellectual prodigy. He certainly is the wonder of the learned world. Besides understanding more than fifty languages, he has accumulated a richer treasure of historical and miscellaneous information, than probably any man living, and yet, in his letter to ex-Governor Everett, he states that his poverty compelled him to labor at the anvil EIGHT HOURS DAILY. This is the one main secret of his greatness. "Go thou and do likewise," and train up your children, too, in harmony with this principle.

163. GROWING YOUTH AN EXCEPTION TO THIS LAW.

Since youth requires a great expenditure of vital energy during adolescence, the vitality should predominate over the

mentality. The order of nature requires that the great proportion of their vital energies should be expended in laying a deep and broad foundation for a corresponding superstructure of mental greatness, and every item of vitality required by the body but expended on the mind only weakens both. The great fault of modern education is robbing the body to develope the mind—trying to make learned babies and nursery prodigies at the expense of health. In doing this, parents often make them simpletons for life, or else youthful corpses. As when the miser had learned his horse to live without eating, it died; so just as these children become extra smart, they die. Where are those poetic geniuses the Misses Davidson? In their graves at fifteen! What folly parental vanity often perpetrates! Better no education than such robbing of the body, ruin of the health, and destruction of life. Especially better to ripen too late than too early. Throughout nature, "late ripe, late rotten." As early fruits soon decay, but late ones keep all winter, and as the poplar tree, and all vegetables which grow fast, die soon, while the slow-growing oak and pine last long, and do much more service, so it is much better that children ripen late than early. So certain and uniform is this law, that the length of life of all animals can be calculated from the age at which they come to maturity. This law governs all that grows, man as a race, and every individual included. Accordingly, long-lived persons mature late, and our most talented men were backward boys. Adam Clarke was a very blockhead at school—an eyesore to his teacher, and a butt among his mates. And what was young Patrick Henry? The dullest of the dull. Most distinguished men of all ages were backward boys; and in general, they entered on their career of greatness late in life. Let my children be children till out of their teens, and enter too late upon the business of life rather than too early. This eagerness of our youth to begin life early occasions immense misery. I would not leave the minds of my children an uncultivated waste, yet I would expend only their SURPLUS vitality in either study or labor, nor sacrifice one iota of health to mental acquirements. The brains of children are soft, and their

nerves less sensitive to burns, bruises, colds, and hurts, than those of adults. The nervous system is the last to mature, and last to yield to the approaches of age and of a natural death. Hence little pains should be taken to cultivate the intellect until nature has fully matured the brain and nervous system. Some species of animals, the dog included, are born blind. What consummate folly to cut open their eyes, or put on glasses, or attempt to make them see by artificial means before their natural time! Let nature have her perfect work. Follow where she leads; but never precede her. Let your first labor be to give them STRONG CONSTITUTIONS, and to lay in as large a supply of physical energy as possible. You may cultivate their intellects, but not so much as to withdraw their energies from growth. Let intellectual attainments be what nature has made them, SECONDARY, in point of time. Would you not lose by hurrying your fruit-trees into bloom so early that the frosts of spring would certainly nip the bud?

164. EXCESS OF CARBON A PROLIFIC CAUSE OF DISEASE.

If this great law of health—proportion of function—requires confirmation, it is to be found in the number and aggravation of those diseases engendered by an excess of carbon in the system. Why do northerners sicken at the South? Because they continue to eat as freely as before, yet, since a given quantity of oxygen can combine with no more than its fixed equivalent of carbon, and since a warmer and therefore more rarefied atmosphere prevents their inhaling as much oxygen as at the North, they of course evacuate less carbon from the system by respiration than they take into it by eating and drinking. A surfeit of carbon is the necessary consequence, and this induces those malignant fevers which prevail in tropical climates. Southern emigrants who eat less and bathe much escape, because they occasion no such glut of carbon, and all who "move South," besides eating less, should eat food less highly carbonized, for the same reasons that we should eat less, and less highly carbonized food, in the summer than winter.

The summer complaints of children have the same cause—excess of carbon. This is rendered evident by the fact that

they prevail most in hot weather, and diminish as the cool season approaches, because they then inhale more oxygen, and thus consume more carbon, thus partially restoring the proportion between the two. And if parents would administer less food, and that less carbonated, to children during the summer months, many who now sicken and die would escape. Hence give such little if any butter, fat, or sweets, because they all contain a great proportion of already superabundant carbon.

Dyspepsia consists mainly in this same carbonic surplus—also established by the improvement generally consequent on the approach of cold weather. And all whose health is better in the fall and winter than spring and summer, may rely upon it that their maladies are occasioned by surplus carbon, that is, over-eating.

And what is the consumptive process but one of an excess of carbon over oxygen? As the lungs waste away, they afford a less surface for oxygenating the blood. Of course less carbon is burnt up, the body is cold, and the system decays. Let such be doubly particular to reduce their eating and enhance their breathing. Of what use is any more carbon than can be burnt up by respiration? And as their stomachs are more vigorous than the lungs, of course they should eat less than they crave.

These views are still farther sustained by the chymical analysis of the putrid matter of biles, fever-sores, ulcers, diseased lungs, and the like—it containing about fifty-four per cent. of carbon. Indeed, most obstructions, irritations, inflammations, and the like, will doubtless be found to consist mainly in its surplus. These abscesses may therefore fairly be considered as the outlets of that surplus carbon which occasioned them. Hence their beneficial influence. Hence, also, butter, fat, sweets, and other highly carbonated substances, provoke biles and cutaneous eruptions. So do high living and over-eating.

These proofs of our doctrine of proportion might be extended illimitably, but is it not too obvious to require it? Does it not unfold a FUNDAMENTAL condition of health and

cause of disease? Is any other equally essential to mental or physical capability? And if physicians understood this law, and labored to restore that lost balance which occasioned the disease, instead of dosing down powerful drugs, they would save a large proportion of those patients whom they lose. And if mankind in general would preserve or restore this proportion, if the sedentary and fashionable would study and fret less, but take more exercise, laborers rest and read more, those who have over-eaten would fast, and those who sit much in-doors would exercise much in the open air, the great majority of chronic invalids would soon be gladdened by returning health, that most dreadful penalty of violated law—death—be postponed a score or two of years, every faculty of body and mind be incalculably enhanced, and their pains supplanted by pleasures. PROPORTION between the eating and breathing, and between these two and muscular action, and between all three and the exercise of mind and feeling, will ensure the observers of this law a high order of intellectual capability, moral excellence, and a long and happy life. And the application of this law to the mental faculties will constitute much of the frame work of the next volume. Next in order, strictly speaking, comes the MEANS OF SECURING THIS BALANCE: yet we wish first to present another aspect of this law itself, namely,

165. EXHAUSTION AS INVITING DISEASE.

Exhaustion, temporary and permanent, physical and mental, consists in a deficient supply of vitality as compared with its expenditure, and hence in the violation of this law of balance, and occasions an almost incalculable amount of disease. Vitality resists disease in proportion to its abundance. As an active skin nullifies exposures to colds which overcome a feeble one, so strong constitutions withstand exposures which would break down weak ones. Take an example. While full of vitality and animal vigor, say in the morning, wet feet, malaria, noxious gases, contagion of various kinds, extreme cold, or exposures, are resisted with impunity, whereas when fatigued, deprived of sleep, or hungry, comparatively trifling

exposures overcome the system and sickness ensues. Keep on a full head of vitality and it will both resist and also eject disease. This is confirmed by the fact that we rarely sicken suddenly, but are ailing more or less for days or weeks beforehand, because debility, by cutting off the supply of vitality, leaves the system too feeble to resist renewed exposures. Even in apoplectic, and other sudden attacks, disease has been undermining the system perhaps for years. Most forms of disease, taken in season, can be thrown off at once, and protracted illness averted. Extreme and protracted exhaustion generally precedes and induces consumption, many of its victims having first worn themselves completely out just before being taken down; whereas but for such exhaustion they would have escaped. Many a one has been prostrated by disease after having watched day and night around the sick bed, not, as generally supposed, because the disease was contagious, but because their exhaustion left the gates of life open to the ingress of the enemy. That excessive labor invites disease is a matter of general experience and observation. How many, after seasons of unusually protracted and arduous labor, first became debilitated and then sick. American females in particular, contract many of their diseases in consequence of protracted exhaustion, occasioned by undue confinement within doors, late hours, restless children and consequent deprivation of sleep, perpetual kitchen drudgery, unintermitting toil, and kindred causes; and many chronic invalids can be cured simply by rest and recreation, whose case medicines can never reach. They have expended animal energy faster than supplied it, become debilitated, are thus exposed to disease, and can be restored only by restoring the equilibrium of the system.

To one application of this idea special attention is invited —to the absolute necessity of providing a RE-SUPPLY of vitality. This exhaustion so fatal to health, so prolific of disease, is not generally occasioned by too great an EXPENDITURE as much as by an undue SUPPLY of vitality. Invalids might expend much more than they do with impunity, provided they would promote its RE-SUPPLY by obeying the laws of health. Like a poor farmer, they take all off but put nothing on,

whereas if they kept up a full supply of vitality they could greatly increase all their labors, yet not overdo.

166. RESTORATION OF THIS PROPORTION.

This balance once lost, can it be restored ? It can. Every function can be promoted and retarded. Indeed, nature's universal tendency is to secure this restoration. As over-taxed organs rob the others to obtain vitality with which to discharge their load [78], so strong organs succor weak ones. Besides this, that same restorative principle which has provided remedial agents in general [158], has also provided for the removal of this cause of disease. By what MEANS, then, can an end thus important be secured ?

One means is by diet [36 37]. Another is by EXERCISE. By a law of things, the normal action of any organ augments its power. Of this all are experimental witnesses. The hands of sailors become large and powerful because used energetically and vigorously in clinging to the rigging and handling ropes, and a similar increase is apparent in all labors. The arms of the blacksmith, the feet of expert dancers and pedestrians, the chests of habitual rowers, the muscles of laborers, compared with those of the sedentary and fashionable classes, all manifest a similar increase, and by the same means. Let any man having large and powerful muscles confine himself to writing or books for years, and his muscles will decline in size and strength, but re-increase if he again returns to a laborious occupation.

The reason of this increase by exercise is apparent. Action causes a proportionate flow of blood to any and all the parts exercised, and this blood is freighted with the materials for the supply wasted. And since this resupply is commensurate with the exhaustion, of course the parts exercised most grow the fastest.

But the increased POWER OF FUNCTION is far greater than that of size. Thus let a new hand go into the blacksmith's shop, and the muscles of his arms grow rapidly, yet improve in EFFICIENCY far more than in size, and thus of all other exercised parts.

To apply this law to the lungs. A man of only ordinary vocal strength becomes a chimney-sweep, or street-pedler in our cities, so that he is obliged to hallo perpetually, and he soon acquires a strength of lungs and power of voice which resound above the clatter of carriages, and all the din and roar of the most thronged streets. Take oyster pedlers as examples. And this tremendous bellowing they put forth hour after hour, day after day, and month after month, year in and year out. Behold the astonishing increase of vocal power consequent on EXERCISE.

The gastronomic powers of gluttons[65], furnish another illustration of this law of increase by exercise. Men can divert nearly all the energies of their system to their stomachs. Yet our subject is too apparent to require enlargement. Weak organs CAN be strengthened, and to an astonishing degree. The only remaining question then is—How can such action be promoted?

167. WHO REQUIRE MUSCULAR ACTION, AND HOW TO PROMOTE IT.

Whoever is benefited by exercise, feels better after taking it, sleeps more sweetly, experiences an increase of appetite, or additional clearness of mind or agreeableness of disposition, requires more, as indeed all whose business confines them much within doors, and also those who feel a craving for motion. To determine whether we need it is just as easy as to determine whether we require food, and by a similar index—an APPETITE for it.

To show HOW to exercise would be superfluous. All required is to administer a few cautions. Sedentaries, convinced of their need of it, often take it in excess, or unseasonably, or too violently. That same appetite which demands it, closely watched, will admonish the instant this occurs, when the patient should desist AT ONCE. A kind of trembling, hurried, excited, and yet weakened state of the muscles, so that instead of playing easily and voluntarily, they must be FORCED, indicates excess, which always injures. Stop exercise the instant such trembling commences.

It should be taken when the system is prepared to sustain it, and is often beneficial after severe mental application. Before meals, especially before breakfast, is generally a good season. Just before retiring is a good time, when it has not been taken during the day, and by those who resort to in-door exercise. "Better late than never."

Its kind should also be such as to develop all the muscles. That same law of balance just illustrated requires that every muscle in the body should be exercised every day of our lives.

Yet some work too hard, so that their muscles rob their brains, and thus become stupid in mind, averse to study, drowsy over books, and blunted in their finer sensibilities. Such should work less—should perhaps restrain their craving for action, just as those who over-eat should restrain appetite.

But having enforced the necessity of muscular action in general [135 138 140], and also the necessity of proportion of function [162], and by consequence the double importance of exercise to those whose muscles have become enfeebled by inaction, we come next to

163. THE PROMOTION OF DIGESTION.

The opinion has already been expressed, that colds and indigestion were the great causes of the diseases of our climate [108]; and also that most diseases consist in disproportion of function [162]. Both colds and dyspepsia are embraced in this want of balance. Though dyspepsia itself rarely terminates life, yet it is the parent of many diseases that do. It fills the system with morbid matter, unfit to take part in the vital process, and therefore irritates and fevers both body and brain. How indigestion breeds corruption and disease has already been explained [76]. The amount is almost incredible. Take a single illustration. The breath of dyspeptics is always fœtid, because of the corruption thrown off through the lungs. Suppose yourself compelled to inhale all the odor or obnoxious matter in the breath of many a dyspeptic, it would soon sicken, if not destroy you. Yet you would inspire no more than they expire. How vast an amount of corruption and animal poison

some breathe out every hour of their lives! But no more than their disordered stomachs manufacture. Yet all is not expelled. All the evacuations put together cannot unload it as fast as it is engendered, and hence it gathers on the lungs and brain in the form of phlegm, oppresses the lungs, irritates them, and engenders consumptions, fevers, and all sorts of complaints. Dyspeptics expectorate most while suffering from indigestion, because the salivary glands are closely inter-related with the stomach, and hence the mucus consequent on indigestion. Hence all bad-tasting phlegm should always be SPIT OUT, never swallowed, yet sweet-tasted spittle should be swallowed [64].

But it is on the nervous system and brain that dyspepsia exerts its most deleterious influences. The corruption and rank poison it engenders cannot but lash up both nerves and brain to abnormal and therefore painful action. Dyspeptics always feel irresolute, gloomy, and wretched, in proportion as their disease is aggravated, however favorable for enjoyment all their external circumstances. I should disdain the fortune of an ASTOR if indigestion accompanied its reception. However wealthy, or respected, or beloved, or otherwise capacitated for enjoyment, they are poor, miserable creatures—poor, because they cannot enjoy, however much they may possess of the bounties of nature, and miserable, because this disease turns even their facilities for happiness into occasions of pain. They would go mourning even in paradise. Brother dyspeptics, I pity you from my inmost soul. Twenty tedious years have I experienced its prostrating tortures, but am gradually exchanging its sour grapes for the sweet fruits of restored digestion. Listen while I tell you how to unloose its fetters and extricate yourself from its vassalage.

Whether your complaints are caused by indigestion may be known by some of its signs. It generally emaciates. And those who are perpetually growing more and more thin-favored, and specially sinking in at the abdomen and cheeks, may know that this disease is approaching; as may also all who feel a gnawing, sunken, fainting, "gone" sensation at the stomach, or are unable to postpone their meals without in-

convenience, or who feel a ravenous appetite and still continue to crave after they have eaten freely; or who feel prostrated, inefficient, listless, misanthropic, or unusually irritable and fretful; or who belch up wind frequently—it being a gas formed on the stomach by the souring of their food [70]—or who feel misanthropic, hating, and hateful. Dyspeptics are perpetually cramming, yet virtually starving, because their stomachs do not extract from food its nutrition, and, paradoxical as it may seem, the more they eat the more they starve.

Besides being hollow-cheeked, and lank in the abdomen, they are generally costive. This is occasioned by the sluggishness of the stomach and bowels; and the removal of this single symptom or effect of this disease will generally obviate this disease itself.

169. CONSTIPATION—ITS EVILS AND REMEDY.

Its evils are quite as great as generally represented. It closes one important outlet of the waste matter of the system, which health requires to be kept open at some rate. Yet not by medicines; for they excite only temporarily, and leave the bowels weaker than they found them, so that increased doses are required to re-open them. Never resort to ANY kind of medicine, not even rhubarb, for a cure, but rely wholly on DIET and MOTION. Many kinds of food are highly aperient. Fruit always has this effect; yet thus opened, the bowels do not relax into increased lethargy. Coarse, unbolted bread is still more so. Hence, many are obliged to eat it sparingly, because it is too opening. Its bran stimulates the coats of the alimentary canal, besides increasing the fæcial bulk. Dyspeptics should always eat freely of it in conjunction with fruit, and may thus cure the most obdurate cases. Buttermilk is another powerful cathartic, and used with bran bread will be found efficacious. Rye and Indian bread is quite as opening, and all rye is excellent, and the more aperient the more bran is left in. A pudding made by stirring unbolted rye flour into boiling water, eaten with molasses, sugar, milk, or fruit-sauce, will be found most excellent. So will Indian and oat-meal pudding, eaten with molasses or

fruit-sauce. Rhubarb sauce, and pies, if their crusts are made just right, and also nuts, are still more opening. So is cider fresh from the press. So is lemonade. In fact, the dietetic kingdom is full of aperient agents endowed with quite as much power as cathartic medicines, and hence the former should always be resorted to, because they leave the bowels in a more healthy and active state, whereas every dose of medicine ultimately weakens and binds. Whenever cathartics are needed let them be taken IN FOOD, rarely in medicine.

INTESTINAL MOTION, whether effected by kneading the bowels, or by bodily exercise, also obviates both indigestion and constipation. A few years ago an infallible cure for dyspepsia was proffered on two conditions—strict secrecy and a high fee. It consisted simply in kneading, and otherwise giving motion to the bowels. For dyspeptics, exercise, and especially those kinds which call the abdominal muscles into play, will be found a specific cure. Fomentations applied to the bowels are excellent. So are cloths wrung out of water as hot as can be borne, and laid on them, and changed every half hour. Water injections, cold and warm, are still better—in fact, are infallible cures, if continued. Putting the thumbs across the hips, and extending the fingers forward to, and kneading the abdomen is also excellent, as are all forms of rubbing, kneading, and friction, and striking them with the hands or fists. Copious draughts of cold water on an empty stomach will help this complaint. Laying on cloths wet in vinegar, and rubbing them with an iron as hot as can be borne, will do great good.

REGULARITY IN THE EVACUATIONS is scarcely less important than this whole subject of diet. Every individual, and particularly the costive, should see to it that the bowels move every day, and this can easily be secured by attending to this function at stated periods each day, as on rising, or after breakfast, or dinner, or supper, and the earlier the better. A little attention to the formation of regularity in this matter, will effectually obviate constipation, and do much towards restoring digestion. Mothers should form this habit in childhood, and all should practice it till it becomes second nature.

Neglecting to attend to this call of nature, and to a kindred evacuation, occasions more disease and suffering than can well be imagined—the former costiveness and all its attendant evils, and the latter gravel and its sufferings.

Dyspepsia is generally accompanied by acidity of the stomach, caused by that souring of the food in it already explained. This acidity can and should be removed. One means is by taking those kinds of food and chymical agents which will neutralize it. Alkalies will sometimes do this, yet they are better taken in saleratus bread, which is far better for dyspeptics than yeast bread [54]. Oyster-shells, baked and powdered, are also highly recommended, and may be useful. That they often neutralize the acids of the stomach is evinced by the wind they bring up. Yet do they not leave a deleterious compound in its place? Still they often do at least temporary good. Weak ley, made from clean wood ashes, has a kindred effect.

Some acids decompose other acids, and hence some stomatic acidities may be cured by taking the right kinds of acids. Yet I incline to the opinion that the acids found in fruits are far preferable for this purpose. Hence, lemons often improve the tone of the stomach; and when they do, should be eaten freely before meals, or in food. Hence, also, lemonade is often a highly beneficial drink for dyspeptics, and should be drank, not in gills, but by the pint, when it produces a comfortable feeling in the stomach. And I fully believe that chymistry will yet discover a means of detecting the kind of acid in the stomach, and, of course, some kind of food or medicine which will effectually neutralize it—an application of animal chymistry of great practical importance, and which some of us will undoubtedly live to see made. There are doubtless effectual antidotes in nature, and especially in food, exactly adapted to remove any species of stomatic disorder by neutralizing or carrying off the noxious compound. In fact, I fully believe that science will yet discover particular kinds of food which will effectually counteract every and all disordered states of the whole body. To illustrate. That rank poison, corrosive sublimate, if I mistake not, can be at once

neutralized by eating soap freely, or swallowing any alkali in large quantities. The poisonous virus infused into the system by the bites of mad dogs, and poisonous snakes, can be effectually neutralized by taking certain chymical agents recently discovered, of which I think vinegar is one. Now I fully believe that mankind will yet discover some such antidote for every sort of morbid matter, obstruction, and disease incident to the body. Excess of carbon has already been shown to be one prolific cause of disease; and all diseases thus caused are easily obviated by taking little carbon into the system in the form of food, meanwhile introducing much oxygen in the form of breath to burn it out. Thus, suppose you have a bile or abscess, or fever sore, as the corrupt matter consists mainly of carbon, of course by eating little, and those kinds of food which abound in fibrine, tissue, etc., yet contain little carbon, you reduce the supply of carbon; meanwhile, breathe copiously, so as to burn it up fast [92], and you, of course, soon evacuate this surplus carbon, heal the abscess, and restore the healthy action of the system. Undoubtedly this principle might be applied effectually to the cure of consumption, as it has been to the gravel. And I fully believe this principle of neutralization will soon be applied so as immediately and effectually to cure all sorts of disease, and prolong life to twice and thrice its present period. I earnestly commend this point to the scientific researches of chymists, and to the practical experiment of all.

Stomatic inflammation also accompanies indigestion, and causes those pains incident to dyspepsia. This can be easily reduced, and along with it those cravings of the appetite already shown to accompany dyspepsia [76]. You eagerly ask HOW? This brings up

170. THE DRINK OF DYSPEPTICS—ITS KIND, TIME, AND QUANTITY.

Cold water is undoubtedly man's natural beverage [103]. On this point we need not enlarge. Besides promoting health, its medicinal properties are also great. It is one of those powerful neutralizers of the corrupt matter in the stomach, the virtues of which have just been shown [168]. Have dyspeptics not often

noticed copious eructations of gas soon after having drank freely? The mineral substances of the water combined with and neutralized some of the obnoxious matter in the stomach, and hence the gas. Probably nothing equals water for reducing inflammation. Dip a burn into cold water and keep it there half an hour, and its inflammation and consequent smarting will subside. Immersing a cut, or bruise, or sprain, or fracture, or rheumatic joint, or any other form of inflammation into water, and both inflammation and pain will be diminished. For the virtues of water as an antidote of inflammation in all its forms, see the water cure. But this fact admitted, its application to the cure of stomatic irritation follows. No medicine, no diet, nothing equals its judicious application, external and internal, to the stomach of dyspeptics. Its external application in the form of wet cloths laid on the stomach and covered with several thicknesses of flannel to keep in the heat—and for this, night is by far the best time—is most beneficial. Injections two or three times per day are even more so. But the DRINKING of cold water is the medicine for dyspeptics after all—not by stint, but by copious drafts.

Yet the best TIME for drinking is especially important. This should not be at meals, because it reduces the temperature of the stomach below 98° Farenheit requisite for digestion, which it arrests till that temperature is again attained. In fact, dyspeptics should drink nothing with their meals, even though their mouths are dry while eating, because this very dryness will provoke that salivary secretion so essential to prepare the food for digestion[64], whereas drinking, by rinsing down the food, obviates this dryness and leaves these glands to slumber. I even recommend dyspeptics to eat DRY food, as dry bread, crusts, Graham wafers, crackers, and the like, so as to increase the DEMAND for saliva to moisten the food, and thus call the salivary glands into action. To discontinue these drinks may be quite a trial at first, but after a few days will be no trouble.

Nor should dyspeptics drink till some three or four hours after their meals—or, rather, till within an hour or two of the next meal, when they should drink freely till within half an

hour of meal-time, and then discontinue, so that the stomach may regain its temperature.

Copious drinking, before breakfast, of water fresh from the well or spring, accompanied by as vigorous exercise as the patient can bear, will be found especially serviceable. Drink freely again an hour before dinner, and an hour before supper, if you take any, which dyspeptics should omit—or rather be contented to drink instead of eating—and again on retiring. If lemonade agrees with you, drink of that occasionally in place of water, but drink at these times and not at meals, and one month will greatly improve the tone of your stomach.

Add to this all the exercise you can well endure, business relaxation, a light diet, thorough mastication, and slow eating, and you will, in one year—probably in a far less time—be well. Eat in the main those kinds of food which agree best with you, yet abstain from animal food, and live much on coarse unbolted flour bread and fruit.

Especially must dyspeptics EAT LITTLE. Without this, there is no salvation for them. Full feeding will effectually counteract all these and all other remedial prescriptions—will even re-induce dyspepsia after it is cured, and of course aggravate it and prevent its cure. Make up your minds to STARVE IT OUT, or else to suffer all its miseries, and soon end your days. Abstinence is the great panacea. All else only aids, but does not reach its ROOT.

Another cure more effectual than any other except fasting, already frequently alluded to, requires to be distinctly brought forward. Several principles already adduced show that dyspeptics over-eat[70], and are surfeited with carborn[163]. Of course this surplus must be discharged, and such discharge will generally cure them. This can be effected by eating less and BREATHING MORE. Nothing equals breath as a cure-all. Fresh air in large and perpetual doses is by far the most effectual specific for dyspeptics and consumptives that exists. The reason has already been given. In short, let them follow the prescriptions of this work as to the selection, mastication, quantity, and digestion of food, and touching circulation, respiration, prespiration, sleep, exercise, etc., in addition

to the specific prescriptions of [167 168 169], and they will soon be cured.

171. PALPITATION OF THE HEART AND THE PROMOTION OF CIRCULATION.

Hepatic difficulties are the twin sisters of dyspepsia, so that the prescriptions just directed for the latter will cure the former. The two specific directions for curing it are, first, an abstemious, cooling diet, and abundance of fresh air. The blood is too thick and turgid, and hence lodges about the heart. The oxygen of breath thins it [86], so that it flows the more freely. All thus afflicted have noticed that just as they inspire air its beat is quickened and strengthened, but slackens as they expire—proof conclusive that more copious breathing will obviate their difficulty. Such will also generally find their veins too blue, owing to a surplus of carbonic acid [93]. Respiration alone can remove this from the system, and thus still farther thin the blood. Iron filings may aid [92].

Such will also always be found to have cold hands and feet, to be chilly, and to have frequent head-aches—all because their heart is too feeble to propel the blood throughout the system. Whatever, therefore, promotes circulation, will relieve the heart by leaving less blood collected in its veins, and remove the headache by withdrawing that surplus blood which occasions the congestion and consequent pain. This, friction and the bath will do much to effect [105 107 111]. To such the foot-bath will be especially serviceable [125]. Magnetism can also be successfully applied to the relief of the heart and head. As, however, the section on circulation has already discussed this whole matter, repetition here is unnecessary.

172. CONSUMPTION—ITS CAUSES AND CURE.

As consumption is only an obdurate cold [103], the cure for which has already been prescribed [109 110 111], the principles involved in its treatment are already before the reader. Yet we have introduced this point here to add a few important suggestions. Disorder of the stomach induces symptoms often supposed to indicate consumption. Thus a foul stomach loads the system with disease, which settles on the weakest

organ, and this may be the lungs. Hence their oppression is often only sympathetic.

They also evacuate much noxious matter from the system. Thus alcohol, being inimical to life, is taken up and ejected by the lungs, and hence we smell it in the breath of those who drink. By this same law they eject other noxious matters. When, therefore, the stomach is foul, so that food decays in it, and thus engenders a vast amount of corruption [76], and when the pores of the skin are partially closed, so as to prevent its free escape through this channel, it returns with the blood to the lungs, and there gathers on them in the form of mucous or phlegm, irritates, occasions cough, soreness, and all the signs of consumption. Yet dyspepsia is the primary disease, though it often ends in consumption. Such may have consumptive symptoms many years, yet recover, and should follow the directions just prescribed for dyspeptics [163] [169].

This principle applies equally to diseases of the head, nerves, muscles, and other parts of the body, as occasioning consumptive symptoms, and ultimately the disease itself—the cure consisting in that of the primary disease.

But even when consumption proper has fastened upon the lungs, and formed abscesses, it is by no means incurable—no more so than disease of any of the other organs. The great cause of failure is erroneous modes of TREATMENT, not the obstinacy of the disease. Tubercles form in other parts of the system as often as in the lungs—indeed, are the general product or issue of all chronic diseases. They form in the liver, muscles, glands, stomach, heart, and even brain, and can be cured elsewhere. Then why not in the lungs? They are the exudations of corrupt matter, generated in the lungs or elsewhere, and can be cured by arresting the progress of this corruption, and giving nature a chance to repair the breach. This is rarely attempted. Stop the generation of additional corruption and the system will soon relieve itself of what exists. Frequent and copious SWEATING, by reopening the pores and carrying off this corrupt matter, will be found the most efficacious point of attack [111]. Consumptive

night sweats attempt this, yet the corruption accumulates faster than it is unloaded, and hence the disease progresses.

One of the principal generators of this corrupt matter is surplus carbon[163]. As the patient's lungs are small, and their lining membrane partially clotted by phlegm, so as to obstruct the ingress of oxygen and exit of carbonic acid, of course little carbon is burnt in the system, and its surplus is the consequence. Such should eat very little—almost starve—because they can burn up but little carbon. Then why force it upon the system only to aggravate the malady? But as all the principles here involved have been explained, additional enlargement is unnecessary.

173. PREVENTIVES OF CONSUMPTION.

But its PREVENTION is far more important than its cure, because more easy and effectual. It can always be kept at bay, however predisposed the patient. First, then, some of its signs, that those pre-disposed may be on their guard. They will generally be tall, slim, long-fingered and limbed, spindling, small and narrow-chested, inclined to sit and walk bent forward, and their shoulders thrown forwards and inwards, because their small lungs and stomachs cause a pectoral caving in, sunken between where the arms join the body, and to have a long neck, sunken cheeks, long faces, sharp features, a pallid countenance, light complexion, a thin, soft, and delicate skin, light and fine hair, rather a hollow, exhausted, ghastly aspect, long and rounding finger nails, cold hands and feet, and general chilliness, wakefulness at night, great excitability, very active minds, clear thoughts, excellent natural abilities, intense feelings, rapidity of motion, and a hurried manner, liability to be fatigued, in short, a decided predominance of the mental temperament over the vital—of head over body.

The accompanying engraving of Granville Mellen, the poet, who died of this disease, gives a good general idea of the form of the face and person of consumptives.

Yet I have seen those of full, fleshy habits predisposed to quick consumption, though equally so to all other local inflam-

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mations and diseases, because their systems were exceedingly excitable.

The small lungs and hearts of those predisposed to this disease render their circulation imperfect. To promote this, should then be the first end sought by them. Whatever, therefore, tends to retard the flow of blood, especially at the surface, such as sedentary pursuits, confinement within doors, and particularly in heated rooms, habitual sewing, a cramped and forward posture, severe mental application, impure skin, sudden atmospheric changes, colds, and the like, should be sedulously avoided, whereas a light diet, fresh air, out-of-door pursuits, abundant sleep, vigorous exercise, warm climate, and free circulation tend to prevent it. Keep the SKIN clean and active, directions for which have already been given, and you are safe [110 111].

TIGHT LACING is most pernicious to those thus predisposed, because it cramps the lungs, prevents their inflation, inflames them, shuts out oxygen, the deficiency of which is the great

cause of this disease, curtails the action of the whole vital apparatus, and consequent supply of vitality, occasions adhesions, and in many other ways induces this disease. No language can tell the number of premature deaths of both mothers and their offspring occasioned by this accursed practice. To girt up the vital organs is to commit virtual suicide.

Hot drinks, especially tea and coffee, are also injurious, because they increase the liability to take colds, and fever the nervous system, already far too excitable. Drink warm drinks only when you wish to induce perspiration.

Exercise in the open air is also especially beneficial. Yet be very careful not to OVERDO—the great fault of consumptives, because their nerves are too active for their strength. Alternate REST and EXERCISE with abundance of FRESH AIR are your best remedial agents. Compared with them medicines are powerless. Doctor little, but INVIGORATE YOUR GENERAL HEALTH.

Added to general friction, let the chest be rubbed often, with the hand of a healthy and robust friend. Especially let mothers and nurses rub narrow-chested children much.

The full and frequent INFLATION OF THE LUNGS is especially advantageous. In this alone consist the virtues of Rammage's tube. Yet such inflation can be effected better without than with any kind of tube. Sit or stand straight, throw the arms back, and chest forward, and then draw in slowly as full a breath as possible, and hold it for some time, perhaps meanwhile gently striking the chest, so as to force the air down into the extremities of all the air-cells of the lungs, as well as enlarge the lungs, and keep up this practice habitually, and consumption will pass you by. Nor will many other practices contribute more to general health. An erect posture is especially important, and warping forward and inward—which consumptives are apt to do—very detrimental, because it cramps and impairs the vital apparatus, especially the lungs. Reading aloud, speaking, singing, vocal training, and gymnastics—all right EXERCISE of the lungs—will strengthen them, and thus keep this disease at bay; yet care should be taken not to exercise them to EXHAUSTION. Cuvier cured a consump-

tive predisposition by lecturing, and so has the author. When he first began to lecture and examine, his lungs were feeble and irritable, having twice laid him up for months, but they began to improve at once, and can now endure almost incessant talking during the day, and two or three hours of public speaking every evening in the year—they being the last to tire.

Sea voyages are much recommended, and also southern climates. Both, by promoting SURFACE circulation and perspiration, are eminently beneficial. Yet if the same ends can be obtained at home the effect will be the same, and all the evils incident to voyages, absence from home, exposures, etc., be avoided. Southern climates are even less favorable to consumptives than a northern, because of the rarefied state of the atmosphere, and consequent deficiency of oxygen—one of the main elements required by consumptives. Indeed, I see not why inhaling oxygen gas, perhaps somewhat diluted, would not prove eminently serviceable. And whatever will cure this disease will prevent it, and the reverse. We conclude by giving directions for the regimen of

174. THE CHILDREN OF CONSUMPTIVE PARENTS.

Quinsy, sore throat, croup, inflammation on the lungs, and liability to colds, all spring from a consumptive predisposition, and can be cured by whatever prevents it. Besides the applying to such children preventives already prescribed for consumptive adults, let them not be sent to school early, but allowed to run wild, at least unconfined within doors till into their teens. Sitting in school is especialty pernicious, partly because of the vitiated air of school-rooms[99], and because their small lungs make them naturally bend forward, and also warp inwardly so as to retard all the vital functions. Folding the arms upon the chest is especially detrimental, because it impedes respiration. Fold them behind, if at all, so as to throw out the lungs. As the heads of all such children are too much for their bodies[162 163], neglect their mental culture, but make every effort to develop and fortify their physiology. They should do little else than EXERCISE, EAT, SLEEP, and

GROW TILL TWENTY, and even then not hurry to marry, or engage in business till fully matured, though such are liable to do both while too young. They require all their energies for growth, and to divert them from the physiology to the mentality is to increase that very cerebral ascendancy in which their consumptive tendency consists. They border on PRECOCITY [162], and require to be kept FROM study instead of sent to school. If boys, furnish them with tools instead of books, and encourage them in all kinds of athletic exercises, such as making and flying kites, sliding down hill, skating, swimming —yet never allow them to remain long in the water at a time —riding, working, wrestling, climbing, racing, shooting with bow and arrow—a most excellent means of developing the chest—and above all talking loud and halloing much, so as to expand their lungs. The more noisy the better for their health, and the more averse to study the less liable to consumption. But let them live mainly on bread, milk, and fruit, and retire and rise early. Meat will injure them, because it still farther stimulates them [45]—the reverse of what they require—whereas milk soothes and quiets them. Let no fears be entertained that they will be dull scholars or ignorant men. Their brains are too active already, so that without schooling they will eclipse others with. Nor put them early into law offices or stores, but LET THEM GROW FIRST. Especially, if they must go to college, do not let them begin to fit till at least twenty. Rather let them work on the farm till fully matured. Nor ever put girls thus predisposed to any sedentary, confining, or sewing occupation, or to work in factories. Rather let them work in kitchens—anything that will improve health and prolong life. Perhaps few things invite consumption more than sitting and sewing steadily in warm rooms.

Especially important is it that such bathe. A consumptive patient was cured by being taken winter mornings to Amboy bay, and immersed in a hole cut through the ice. The colder the weather the more important the cold-bath to such children, followed with brisk friction. Follow these directions and they will escape consumption and live to a good old age.

175. THE CURE OF DISORDERED NERVES.

The mental signs of nervous disease or state of feeling, has already been pointed out. It remains to give a few physical indices, so that those thus afflicted may know what ails them. Tenderness, amounting perhaps to soreness, on the top of the head just behind Veneration betokens this disease. The reason is this. As the heart, lungs, stomach, muscles, and all the internal organs have each their respective cerebral organs in the cerebellum, so the nervous system has its center at that seat of the soul already pointed out [151], so that the painful state of the nerves causes pain at this their center, and of course a tenderness at the top of the head over this seat. This shows why nervous derangement disorders all the feelings and renders all the mental operations painful [156]. Hence nervous people can never enjoy life till they restore their nerves.

Besides this tenderness, nervous patients are easily agitated, flustered, and thrown into a confused state of mind by trifles, are easily elated and depressed, quick in all their movements, full of excitement, liable to wakefulness, and full of bad feelings throughout mind and body.

But to their cure. This disease is more frequently sympathetic than primary. Dyspepsia is always accompanied by nervousness. So are heart affections, scrofula, gout, fevers, colds, and nearly or quite all forms of disease. In fact, as the nerves are ramified throughout every organ and portion of the body, and reciprocally inter-related with every part, of course they sympathize perfectly with the healthy and diseased, active and sluggish state of the body as a whole, and of all its parts. Hence, whether nervous disorders are primary or sympathetic, the effectual means of curing them is to restore the tone and vigor of the SYSTEM AS A WHOLE, by obeying those laws of dietetics, circulation, respiration, sleep, bathing, friction, exercise, and the like, already pointed out. True, health of nerves more effectually promotes general health than perhaps all other instrumentalities. Indeed, the perfect reciprocity existing between them and the rest of the system renders it difficult to say whether remedial agents should be ap-

plied primarily to them when disordered or to the system as a whole. But this much is certain, that the promotion of general health is the great means of restoring disordered nerves. Let nervous patients then strictly fulfil all the conditions of health, if they would effect a cure. To a few items, however, special attention should be directed.

1. The importance of bathing, friction, and the healthy action of the skin is to such doubly enhanced, directions for which need not be repeated. The hand-bath, properly applied, will be found an almost sovereign panacea for these complaints.

2. Those nervous subjects who are also dyspeptic need not expect to restore their nerves till they restore their stomachs. The corruption engendered by impaired digestion [76], is so great as to keep even healthy nerves in a perpetual fever. This irritating cause must be removed before health can be restored; directions for which will be found under dyspepsia, [168 169 170].

3. Nervous people are particularly troubled with restlessness. Though perpetually worn out for want of rest, they can compose themselves to sleep only with difficulty, sleep lightly, are restless, disturbed by dreams, easily wakened, and find great difficulty in again getting to sleep. Hence such should sleep ALL THEY CAN. No cure for nervousness at all equals sleep; nor are eight and even nine hours per diem too much for such. They sleep slowly when asleep, yet exhaust them selves rapidly while awake, and hence should devote the more time to this all-important function. Let such observe with especial assiduity the directions for promoting sleep already prescribed [126 127 128 129 130]. To such, light suppers and as much exercise as can be well borne will be found especially important. Yet such hate to move till obliged to, and then are perpetually liable to overdo—not to do too much absolutely, but to do too FAST, so as to induce that trembling already pointed out as a sign of overdoing. If they would only exercise moderately, they might do a great deal more, but their nervousness renders them always in a great hurry, and hence they take hold of exercise too rankly. Such should

work moderately till just comfortably tired, then rest awhile, perhaps lay down, and if possible, take a nap, then return to work, and thus often alternate between action and rest. Day naps to the nervous will be found especially serviceable.

4. To the influence of grief, and all kinds of sadness, melancholy, and despondency, special attention is invited. See how many tolerably healthy mothers have become nervous immediately on the death of a dearly beloved friend or child, have declined rapidly, and soon after followed their lost one to a premature grave. Those at all predisposed to nervous disorder, who may lose friends, must banish grief, not indulge it. Must their death hasten yours? If your grief could benefit their souls, indulge it; but since it injures you in the most effectual manner possible, without doing any good, practical wisdom dictates its banishment. Instead, cultivate cheerfulness and even mirth. Nothing will equally soothe irritated nerves, or tend to restore their tone and happy function.

5. Severe mental application is especially deleterious to nervous invalids. Their disorder consists mainly in predominant cerebral and nervous action [162], and their cure in restoring the requisite balance by reducing it. Those, then, whose occupation requires much mental application, must give up their business or their happiness, if not lives. The former may be like plucking a right eye, but the latter is worse. Why prosecute business at the sacrifice of life? Do you not pursue your avocation simply as a means of enjoyment? Then why not give it up when it conflicts with this only end of life? [1] Besides, by suspending it till restored, how much more you will be enabled to do in the long run. So that, merely for the sake of accomplishing the very business you would do, postpone it temporarily.

What folly to sacrifice a lifetime of business to a few months, or even years! Why kill the goose that lays the golden egg? Cure your nerves first, and do your business afterwards [5].

A light, simple diet is quite as indispensable to the nervous as the dyspeptic. Few things oppress the nerves more than over-eating, or relieve them more than abstemiousness.

6. But a cooling diet is even more important. All condiments, all stimulants, act mainly upon the nerves, and re-excite, and still farther disease them. Hence all alcoholic drinks, wines, beers, cider, ale, all kinds of fermented liquors are fire to them, and should be wholly avoided. Tobacco is another powerful nervous irritant—is fatal to nervous quiet. In common with opium, it exhilarates temporarily only ultimately to fever and disorder. No higher proof of this is required than the feelings consequent on its abstinence. And the more wretched you feel when deprived of your pipe, quid, or segar, the more it has already impaired your nerves, and will increase its ravages. Of which, however, more fully in a proposed work on this subject.

7. Tea and coffee have a similar effect. The stronger teas are rank poison to the nerves, and black teas are poisonous, though less so. Coffee is still worse. Its strong narcotic properties powerfully enhance nervous irritability, and will create, much more aggravate nervous disorder. Susceptible as my nerves are, nothing would tempt me to fever them by tea, coffee, tobacco, or alcohol, and all who do are consummately foolish, and even wicked, and sinning against their own peace. Yet we will not follow up this subject here, but refer the reader to a forthcoming work by the author on their use. Meanwhile, all whose nerves are in the least affected, are abjured to refrain from them wholly and at once. This requisition is ABSOLUTE, IMPERIOUS, INEXORABLE.

8. Powdered lady-slipper root, called valerian, or "nerve powder," sold by Thompsonian practitioners, is an excellent nervous sedative, and should be taken on retiring—about a tea-spoonful steeped in water and sweetened. It promotes sleep, relieves the head, and exerts a healing, soothing influence on the nervous system. I have often prescribed and taken it, always with benefit. The root of itself is probably quite as good as after mixed with cayenne as in the powder referred to, and doubtless a decoction of it put in the water used in bathing, and in enemas, would be excellent. An ointment might doubtless be made of it, combined perhaps with some oleaginous compounds, also quieting to the nerves,

of great practical value; that is, its EXTERNAL application would probably prove still more serviceable than its internal.

There are doubtless other valuable medicines and prescriptions, but these, well followed, in connection with a rigid adherence to the conditions of health, will restore the most aggravated cases of this disease, and make new men and women of many miserable thousands in our land now filled with nervous complaints.

176. PREVENTIVES OF INSANITY.

Of all the diseases incident to human nature, those which affect the MIND are the most grievous, crushing, and absolutely insupportable. To have limb after limb cut from the writhing body, most excruciating though it be, bears no comparison to that horror of horrors experienced "when mind's diseased." How often have those thus afflicted been known to hold their hands in the fire, cut and bite their flesh, or to submit to amputation, and then remark that these things were diversions compared with the indescribable mental anguish they endure! Well may the heart of every philanthropist beat with its fullest and strongest pulsations of sympathy, in view of the anguish experienced by the raging, bewildered maniac; and well may government attempt the amelioration of those thus afflicted, by erecting asylums for their comfort and cure. What practice is as barbarous, as absolutely horrible, as that of confining the maniac, perhaps in a dungeon, in chains, or the strait jacket, treating him as if he were criminal, and perhaps scourging him at that! He is sick, not criminal. To punish one who is dying of fever, or consumption, is truly horrible; but to chastise a maniac is as much more so as his disease is more painful than all others. Ordinary sickness can be endured; but let reason be dethroned, let self-possession be swayed from its moorings, let imaginary demons torment, and all the passions be thrown into tumultuous uproar, the whole man no longer himself, and of all objects of commiseration, this is the most deserving.

But to PREVENT disease is far better than to cure it: the following prescriptions, faithfully adhered to, while they will

greatly mitigate this disease, after it is once seated, will, in most cases, where it is hereditary, if not in all, prevent its developing itself in actual insanity.

Both to prevent and also to cure this disease, it is first necessary that we understand its CAUSE, so as to counteract or obviate it. The cause of insanity, or rather inanity itself, consists in the excessive EXCITABILITY and OVER-ACTION of the BRAIN AND NERVOUS SYSTEM [162]. Its prevention, therefore, can be effected only by REDUCING this over-action. And the remark is too obvious to require more than its mere presentation, that precisely the same remedial agents should be employed to reduce this morbid inflammation of the brain which are now employed to reduce other cases of inflammation, and the same means by which tendencies to other forms of inflammation may be prevented, will prevent the inflammation of the brain, and its consequent derangement of mind. Let it never be forgotten that insanity is a purely physical disease—as much so as consumption or cancerous affections, or any other bodily indisposition; and both preventives and cures, to be effectual, must be calculated to prevent or reduce this inflammation.

In order to come the more directly at both the cause and the prevention, as well as the cure of this disease, special attention is invited to one condition which always accompanies derangement, and which is a product of that very cerebral condition which causes madness, and that is, superior natural abilities, accompanied with feelings the most intense and susceptible. And these are causcd by that same exalted action of the brain by which derangement is caused. Consequently, families and individuals predisposed to derangement, are always eminently talented, and possessed of the best of feelings. It is the very flower of community who are thus affected. In fact, this affliction is only the very excess of talent and sensibility. Do superior talents depend upon the powerful action of the brain? So does insanity, only the cerebral action is still greater. As but a narrow line separates the sublime and the ridiculous, so but a step divides the highest order of talents from madness. Nor can a simpleton be crazy. It requires a prodigiously smart man to become

deranged; so that whoever is subject to insanity is "nobody's fool."

Hence, then, to prevent hereditary tendencies to insanity from developing themselves, it is necessary only to prevent this constitutional excitability of the brain from progressing beyond the point of healthy action. And to do this, it is only requisite to divert the action from the brain to some other part, to remove exciting causes of cerebral action, and to keep the brain as quiescent as possible.

To illustrate. Your child is hereditarily predisposed to insanity. You will see this predisposition in his ecstasy of feeling when pleased, and in the overwhelming depth of his anguish when crossed, in the power and intensity of his desires, in his haste and eagerness about everything, and in his being precociously smart and acute. And this is the error. Parents generally try to increase this action, by plying them with study, keeping them confined at school, and seeing how very smart they can make them. But the preventive of this tendency consists in pursuing directly the opposite course. This highly wrought cerebral action requires to be diminished, not enhanced. Study is directly calculated to increase it; so is confinement; but physical exercise is calculated to divert it from the brain to the muscles. Hence, no child or youth, either of whose parents or relatives are subject to derangement, should be sent to school. Nor should they, for the same reason, be vexed or plagued, or excited any way, but they should be allowed to run and play while children, to recreate and amuse themselves, and be happy during the period of youth, and should not enter upon the cares and business of life till fully matured, and then should check that boiling energy which courses through their veins.

Of all occupations, farming is the most suitable for them, as the labor it requires diverts the energies from the brain, and works off that excitement, the excess of which constitutes this malady. With nothing to do, this energy accumulates, and gathers upon the most susceptible part, the brain, and ends in derangement; but open the valves of labor for its escape, and health and sanity are preserved.

Above all, let them sleep much. Put them in bed early, and keep them from being excited evenings. Young people thus predisposed, should never attend balls or parties, or any exciting scenes, in the evening, nor read novels; but they should keep cool and quiet. Most certainly they should never play cards, or any other exciting games of chance, nor take alcoholic stimulants of any kind or degree, not even wine, or cider, or beer, and scrupulously avoid even tea and coffee, because all these tend to augment and develop that excessive cerebral action from which, mainly, they are in danger. They should take LAXATIVES, not tonics—what will diminish their excitability, not increase it. Alcoholic drinks often induce derangement, even where there is no hereditary predisposition to it: much more, then, will they develop a LATENT susceptibility already existing.

As those thus predisposed cannot be too temperate, so they are in no danger of being too abstemious. Indeed, stimulating meats and drinks are doubtless most efficient agents in developing latent insanity. The simplest diet is the best. Milk, by being productive of dullness, is decidedly beneficial. Bread-stuffs will be found far preferable to meats. Indeed, meat should be wholly avoided, because it is a powerful stimulant. It heats and fevers the blood, oppresses the brain, and increases the tendency mainly to be avoided. Bread, milk, Indian and rye puddings, vegetables, rice, fruit, and the like, should constitute the diet of those thus predisposed. Of course from spices, mustards, peppers, pickles, vinegar, and condiments, they should wholly abstain. Excepting alcoholic drinks, nothing is equally pernicious. Only those things should be taken which open the system, and keep it cool. Fruit may be eaten in almost any quantity with advantage, and so may jellies. But, unfortunately, sweet things are relished by such less than things that are sour and hot, such as pickles, peppers, etc. Eat them, but they will hurt you.

Analogous to a cooling diet in its sedative influence, is cold water, both washing and bathing, especially the shower-bath. Cold water is certainly cooling, and as already explained, is pre-eminently calculated to carry off the superabundant heat

of the system, and obviate that feverish tendency which constitutes the predisposition to be avoided[110]. Nothing will be found more beneficial to the insane than cold water applied externally, especially to the head, and taken internally in copious and frequent draughts. This prescription must commend itself too forcibly to the common sense of every reader to require comment or defence.

But above all things, let all thus predisposed, avoid those subjects on which their relatives or ancestors were deranged. Thus, one of the topics of derangement appertaining to the family of a young man who hung himself in the summer of 1842, on account of his having been disappointed in a love matter, was the social affections. He should have known this, and therefore have nipped his affections in the bud, unless he was sure of their being reciprocated, and consummated by marriage. In short, he should never have allowed his affections to become engaged, till he was sure of marriage—a direction suitable for most young people, but doubly so for those thus predisposed, because love is a very exciting thing any how, whereas they require peace and quiet. Still, unless such are able to govern their love, they should locate their affections, though they need not therefore be in haste to marry. A partner having a cool, soothing temperament, should alone be chosen.

But the most efficacious prevention, after all, is to place intellect on the throne, and to bear in mind that this hereditary tendency exists, and when your feelings become powerfully awake to any particular subject, remember that they are constitutionally too active, and therefore magnify everything, and remembering this, will enable you to look on with intellectual coolness upon the bustling tumult of raging passions as upon school-boys at play. Thus, if the predisposition be to melancholy, remember that these gloomy feelings have no foundation in reality, but are the product of your own organization; that but for this hereditary predisposition, the same circumstances would produce opposite feelings; that, in short, all your trouble is self-made, and without foundation, and this will enable you to dismiss them. And so of any predisposition that may beset you. True, this will require much

self-government—a quality of the utmost importance to those thus predisposed, and yet, from the very nature of their disease, so very rare—still it will amply repay all the pains taken in its cultivation; and the preceding prescriptions will do much to mitigate, and finally banish from the human family so terrible a scourge of ignorant, suffering man.

These and all other preventives and cures of insanity, apply equally to the prevention and cure of nervous diseases generally, so that to cure nervous and cerebral disorder, RESTORE THE GENERAL HEALTH.

177. THE WATER CURE.

That the author sets a high value upon the water cure as a remedial agent, this entire work bears abundant internal evidence. Its power and efficacy probably exceed all other medicinal means now known. Of its wonderful healing virtues, its oxygen—of which it contains a large proportion—is probably the chief instrumentality—the varions organs imbibing from it this great promoter of universal life[86]. Scarcely less powerful for good is its efficiency and unequalled capability for removing obstructions—for taking up and carrying out of the system those noxious matters which obstruct the functions of life, breed disease, and hasten death. For reducing inflammations, and consequent pain, too, it has no equal[104 106 107]. It is also an efficient promoter of normal action—of universal life[103]. For reviving debilitated, withered organs, for rebuilding broken constitutions, for cleansing the stomach, bracing the system, and infusing new life throughout all its borders, water excels all other agents combined. It is destined to lay medicines and the lancet on the shelf of the past, and to substitute throughout the whole earth the blessings of health for the miseries of disease, and to double many times over the average span of human life. No family, no individual should be without a knowledge of the best modes of applying it in all sorts and stages of debility and disorder. That knowledge it was the original design of this volume to impart. But its assigned limits are already full.

Other diseases, such as gout, scrofula, and the like, could be similarly treated: yet this is not necessary, because the great

prevention, the great cure, is A STRICT OBSERVANCE OF THE LAWS OF HEALTH.

178. CONCLUSION.

Finally, let old and young, one and all, take every possible pains to PRESERVE AND IMPROVE HEALTH. Behold the infinite perfection of these bodies! Behold the variety and power of their functions. Be astonished at their almost angelic capabilities of enjoyment![1] O who can contemplate this highest piece of divine mechanism without overflowing wonder and gratitude. And was SUCH a structure made to be abused? Shall we bandy about so delicate, so complicated, so infinitely valuable a gift as if an old box? Shall we undo all he has done to secure the invaluable blessings of health and happiness? Shall we impair, vitiate, or break down functions thus inimitably perfect in themselves, thus laden with all the enjoyments of life? Shall we not rather cherish and enhance them? Shall we nurture our land and our trees, and neglect our own bodies? Shall we not love and keep a present thus divine, as well on account of its own intrinsic worth as its Bountiful Giver? Shall we cherish rich earthly legacies yet abuse a divine legacy which is perpetually bringing forth, from its exhaustless store-house, every enjoyment, actual and possible, of life? Shall we love earthly donors the more the greater their gifts, and not worship, with our whole souls, the Author of that life so infinitely above all other bestowments? Life, O how precious! Its wanton waste, how infinitely foolish and wicked! Let others do as they list, but let my great concern be to OCCUPY this heaven-conferred talent while it lasts, and to guard against its injury with Argus vigilance. God forbid my doing or allowing the least thing to impair its efficacy or neglecting any means of enhancing its capabilities. This my sacred duty, my paramount obligation to God and my own soul, let me study, let me fulfil. O thou Bestower of this "pearl of great price," grant or deny whatever else thou wilt, give me intellect to know, and the inflexible determination to practice THE LAWS AND CONDITIONS OF HEALTH AND LIFE—an end which may this book go forth to promote.